FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

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Mar. 1 .... **French Aero Engine Competition.**
Mar. 6 .... **"Sound Detection," by Major Tucker, before R.Ae.S.**
Mar. 20 .... **"The Report of the Aeronautical Research Committee's Panel on Scale Effect," by Capt. W. S. Farren.**
Mar. 24 .... **British entries close for Schneider Cup and Gordon Bennett Balloon Races**
April 1 .... **Entries close for Schneider Cup and Gordon Bennett Balloon Races**
April 3 .... **"The British Aviation Mission to the Imperial Japanese Navy," by Colonel the Master of Sempill, before R.Ae.S.**
June 15 .... **Gordon Bennett Balloon Race, Belgium**
June 21 .... **F.A.I. Conference Opens, Paris**
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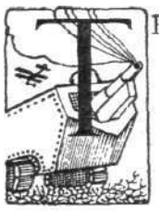
EDITORIAL COMMENT.



THE Interim Report, extracts of which we publish elsewhere in this issue of FLIGHT, by the Committee of three appointed "To consider the present arrangements for air mails and the possibilities for improving and extending them and the co-ordination of the work of the General Post Office and the Air Ministry in connection therewith," is one of the most depressing documents of an official nature to be issued of recent years. Put bluntly, the result of the deliberations of the Committee is that the conclusion has been arrived at that neither European nor internal air mail services are of much use, and that, in view of the acceptance in principle of the Burney airship scheme, there is little need for the Committee to consider an aeroplane service on the route between Great Britain and India. The Report does not, of course, put its conclusions quite as brutally as that, but a careful perusal of the Report leaves one with the feeling that this is really what the whole thing boils down to. And this in spite of the Committee being composed of men, if anything, favourable to aviation.

Air Mails

The question then naturally arises: Is the outlook as black as the Committee's Interim Report would appear to suggest? Frankly, we do not believe that it is. In the main—although there are a few exceptions—the criticisms and objections to air mails raised in the Report are perfectly sound and logical. That, however, need not, we think, necessarily mean that there is no future for air mails, as carried by aeroplanes (and the term aeroplanes is, we presume, used in the Report to include seaplanes also). The pessimistic views of the Committee are probably due to the fact that they are based upon experience obtained with present types of machines. And quite rightly so; the Committee naturally had to base its judgment on actual facts, and not upon hopes and expectations. Nevertheless, this fact has, it seems to us, led to unduly pessimistic views being adopted.

Let us examine briefly the position as it is at present as regards the machines used. The services operating from Croydon are primarily run with the

object of earning revenue from the carriage of passengers and goods. That some of them also carry mails does not alter the fact that the times of departure are planned primarily with the passenger and goods service in view, and not with the object of getting the best value out of what has, after all, up to the present been a minor side-line—*i.e.*, the air mails. Even so, the utility of, for instance, the London-Paris air mail, is not inconsiderable. While it is undoubtedly true, as pointed out in the Report, that there is no advantage in sending off an air mail machine to arrive at Paris about midnight (assuming this to be practicable at the present moment), when already mails posted in London at the end of a business day are despatched by train and steamer and delivered by first delivery next morning, there is an advantage by which the Committee does not appear to have been sufficiently impressed. If a letter is posted in London at the end of a business day, and arrives at the Paris address by first delivery next morning, the French house has time to write a reply, post it by air mail, and have it delivered at the London address on the same day before the close of the business day. That is assuming that the Post Office terminal services are as good as the Report would have us believe. Here again we have our doubts. In practice—and we speak from personal experience—there are in many cases considerable delays in the transmission at the terminals. Whether these occur most frequently on this side or on the other, it is a fact that they do occur.

Then there is another side to the question. We have frequently referred in these columns to the doubtful wisdom of carrying passengers, goods, parcels and mails in the same machine. No doubt up to the present conditions have been such as to make this inevitable, but the time has certainly come when we should begin to specialise, and to use several types of machines for at least goods or (and) passengers, and one for mails. We are quite certain that if this were done the reliability of the air mail would be considerably increased. When a pilot has 10 passengers on board his responsibility is naturally very great, and he has perforce to place "safety first" every time. On the other hand, in a special mail 'plane, carrying no other occupants than the crew, flights would undoubtedly be made in very many cases when a passenger machine would not be despatched.

Much the same remarks apply to Imperial air mail routes, and we must confess to being disappointed that the Committee has seen fit to consider aeroplane (again including presumably seaplane) services of no immediate importance in view of the "acceptance in principle" of the Burney airship scheme. That scheme is not working yet, nor will it be working for at least two years at the best. We do think that the scheme suggested by Gen. Spears and Commandant Faure for a combined Anglo-French service should have been given serious thought. On part of this route, at any rate, it may be presumed that seaplanes would be used, and this raises another consideration: the experimental flying boat service to the Channel Islands was, presumably, chosen because it provided a good route for the early experimental work. That there is a small volume of mails to be carried does not greatly affect the argument, and is merely another instance of machines being used for mails which are mainly run to cater for passengers and goods. On another route, such as from Harwich to Hamburg and Copenhagen, the seaplane is undoubtedly capable of good service, and this fact does not appear to have been sufficiently realised by the Committee.

On the subject of internal services little need be said. That there is little gain when used between London and provincial towns is probably true, but Croydon to the provinces as a link in a longer chain undoubtedly has possibilities, and we are glad to note that the Committee realises this and that the Report refers to the possibility of some such service being developed.

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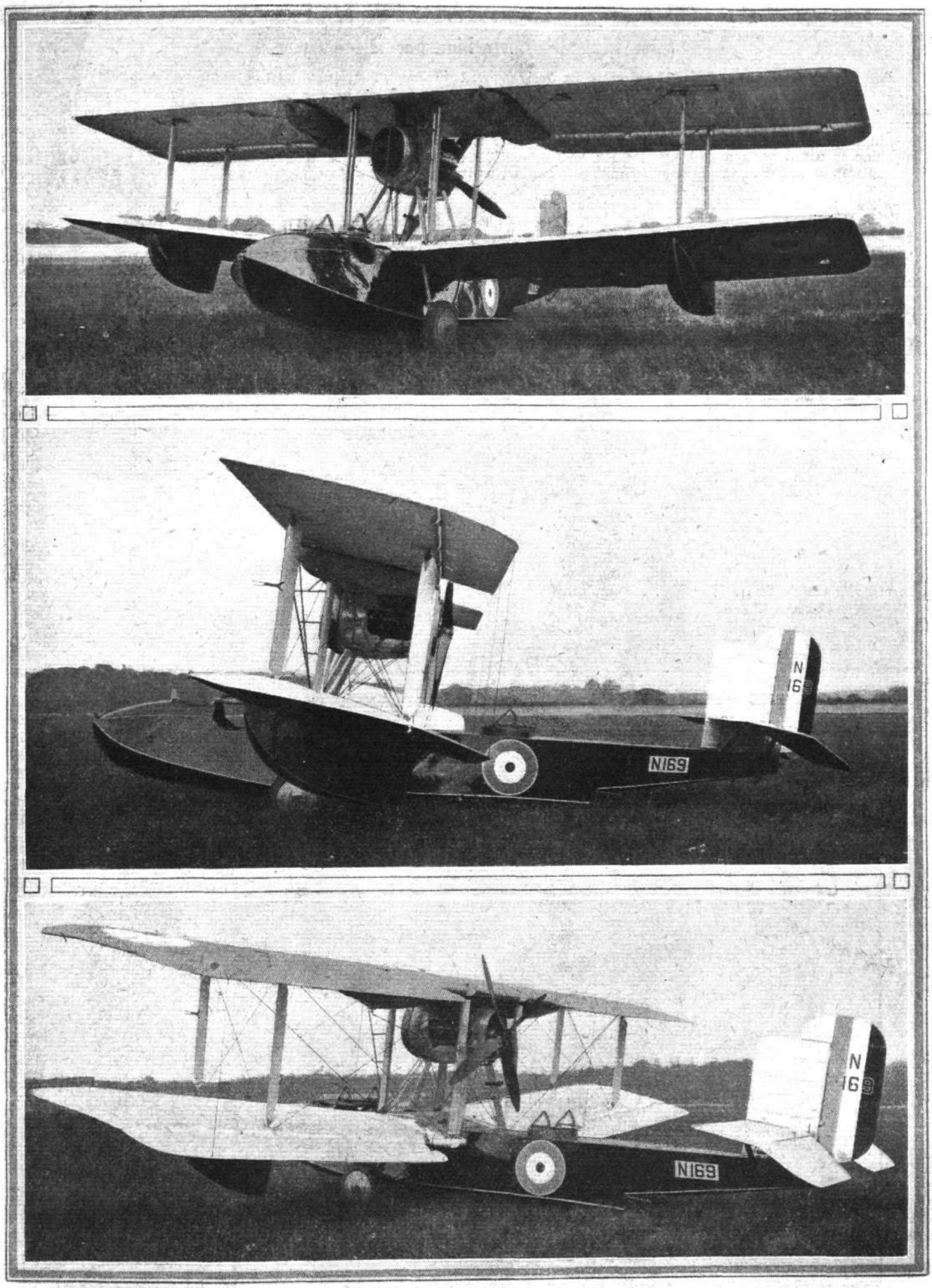
Labour and the Air

Very naturally considerable interest has been aroused in aviation circles concerning the attitude of the Labour Government on matters aviatic. We, among others, had the privilege a few days ago of being granted an interview by the new Secretary of State for Air, Brig.-Gen. Baron Thomson, in which he pointed out that he had been in office such a short period that he had scarcely yet had time to pick up the threads, while on the other hand he was but one of a body of men in the Cabinet, and had not yet had an opportunity of discussing air matters with them to any great extent.

From the interview we came away with the feeling that the new Secretary of State for Air is extremely keen on aviation matters, commercial no less than Service, and he stated that so far as he could see the greatest danger that threatened this country, if not the only danger, was from the air. From this it may, therefore, be assumed that Gen. Thomson is very much alive to the importance of air defence, and will use his influence to ensure that whatever reductions are made in our fighting services, the R.A.F. will not be handled so as to endanger our safety. Much will, of course, depend upon the interpretation of what constitutes an adequate air defence.

On the commercial side we received the impression that Gen. Thomson, while fully realising the importance of civil aviation by aeroplane, is somewhat of an airship enthusiast, and he expressed the opinion that it would probably be easier to gain the confidence of the public in airship travel than in flying by aeroplane. The statements to which the new Air Minister felt justified in committing himself were so few that at present one must reserve judgment. Personally we are more than satisfied that in the new Air Minister is found an enthusiastic advocate of air progress, and it remains to be seen how far he is strong enough to carry with him his brother Cabinet Ministers.

As regards the statements that have appeared that the Labour Government intends to call an International Conference to limit aircraft, this must be a purely academic movement, as hopeless to attain as it is a perfection devoutly to be hoped for. That this is generally recognised is evident from the fact that at the 1921 Washington Conference the decision was unequivocally against the limitation of aircraft. For us, therefore, to neglect this side of such a "peace power" would be national suicide, as it is practically impossible to have control or reasonable check upon the development and construction of aircraft by any other nation, even down to the smallest. The Government that took risks in this direction would indeed be well on the road to invite the dismemberment of the British Empire.



THE VICKERS "VANELLUS": This machine, which is a three-seater Fleet Spotter of the amphibian flying boat type, is a development of the Vickers "Vikings," from which it differs chiefly in the monoplane tail and in the pronounced "tumble-home" to the sides of the boat hull. The engine is a Napier "Lion." The wheels are raised by being swung back and up, as distinct from the "Vikings," in which they are swung forward and up. The undercarriage incorporates an oleo landing gear.

THE "FEIRO I" COMMERCIAL MONOPLANE

First Hungarian Machine has a Rotary Engine

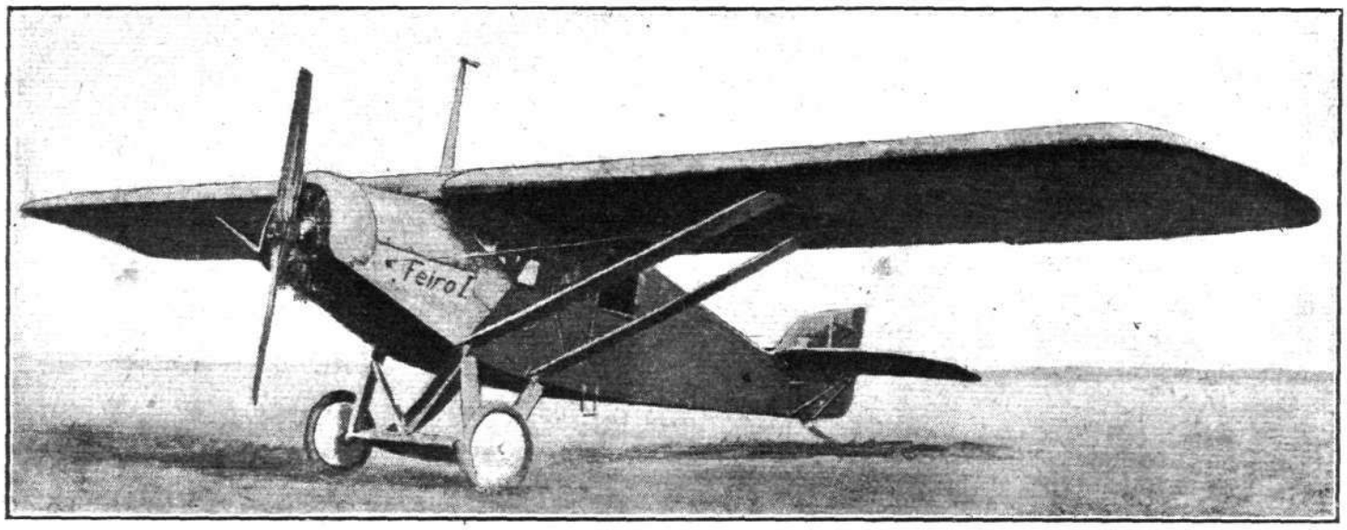
A NEW commercial monoplane, the first to be designed and built in Hungary, has recently been completed at the Budapest works of the firm of Feigl and Rotter. The machine was designed by Herr Ladislas Rotter, and is shown in the accompanying illustrations. It will be observed that the machine is fitted with a 120 h.p. Le Rhône engine. This engine was installed in the first experimental machine, as it happened to be available, but we understand that in subsequent machines either Haacke or Siemens radial engines will be fitted, although any engine developing between 100 and 140 h.p. can be fitted.

The "Feiro I" is a strut-braced monoplane, with the wing resting on top of the fuselage. A very high factor of safety has been adopted, no less than 12, a figure that appears unnecessarily high for a machine of this type. Constructionally the machine is of interest mainly because of the extensive use of three-ply wood. The entire fuselage, with the exception of the nose, and the wing are covered with this material, the wing being built without internal drag bracing.

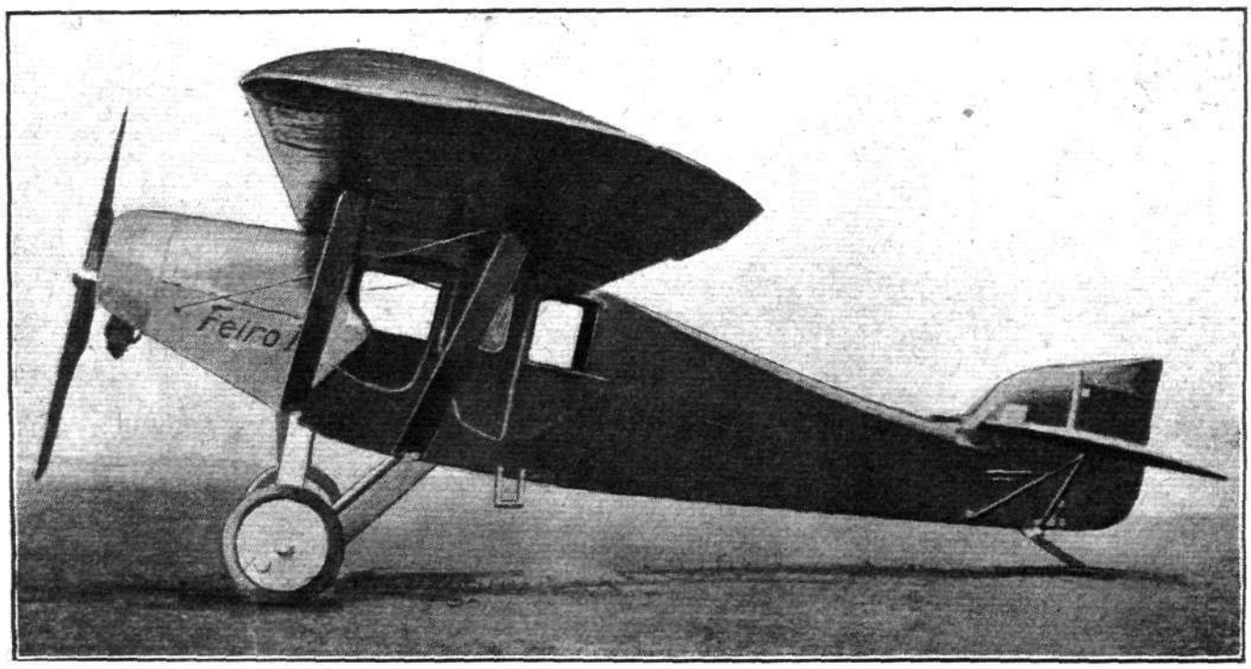
The monoplane wing is built in two halves and braced to the lower longerons by two struts on each side. The wing spars are of box section with spruce flanges and three-ply webs. The ribs are also mainly of three-ply, and to them is nailed the three-ply wing planking. The wing can be dismantled by undoing eight bolts. The section used is one of the Joukowsky-Göttingen "tadpole" sections, having a maximum life coefficient of 0·8 "absolute." Thus, in spite of the high wing loading, the landing speed is stated not to be unduly high.

The fuselage, as already mentioned, is a three-ply covered structure of rectangular section, capped by a turtle-back fairing. The front portion of the fuselage is, however, a steel tube structure, and is covered with sheet aluminium up to the front of the cabin. The latter has seating accommodation for four occupants, or rather two side by side in the rear (enclosed) part, and two side by side (pilot and passenger) in the forward part, which is partly open, owing to the cockpit opening being cut very low on the sides. This has been rendered possible by making the deck fairing very deep in proportion to the depth of the main fuselage structure. It would not appear that the pilot's view forward can be particularly good, as the deck fairing in front of him is fairly wide.

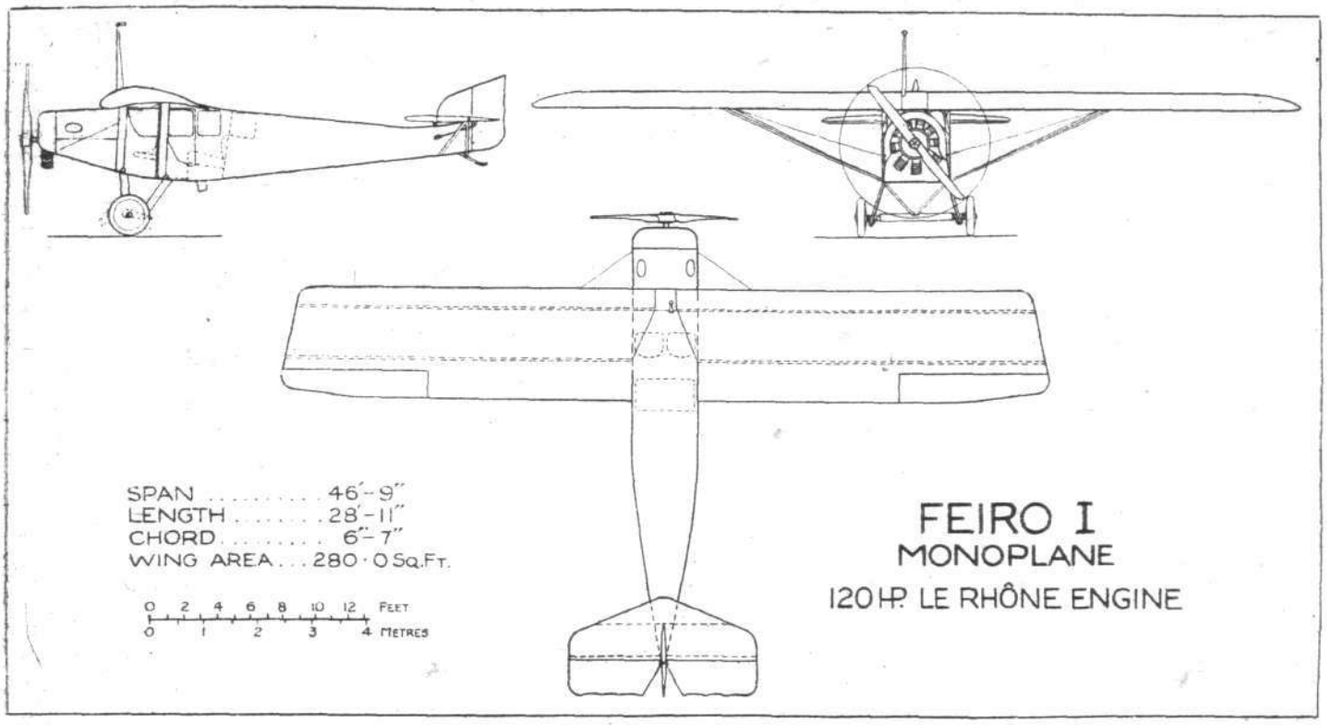
Access to the cabin, as well as to the pilot's cockpit, is by a door in the side, and in addition the cabin is well lighted



THE "FEIRO I" COMMERCIAL MONOPLANE: Three-quarter front view.



THE "FEIRO I" MONOPLANE: Side view.



THE "FEIRO I" COMMERCIAL MONOPLANE : General arrangement drawings.

by large windows, which can all be opened for ventilation. As the cabin width is close on 4 ft., there is ample room for the occupants to sit side by side. Dual controls are provided in the pilot's cockpit, one of the sets being easily removable. A trimming tail plane is fitted so as to allow of flying with full or part load. The fin and tail plane are covered with ply-wood, while the rudder and elevator are fabric-covered.

The undercarriage is of the "vee" type, braced laterally by "vee" struts in place of the more usual wire bracing. The engine housing is separated from the cockpit by two fireproof bulkheads placed some little distance apart. Between these bulkheads is placed the carburettor, the space between the bulkheads being ventilated by the air blowing past the openings in the sides. The petrol tank is mounted in the centre of the wing, above the cabin, and direct gravity feed from the main tank to the engine is provided.

The main characteristics of the "Feiro I" are as follows : Length over all, 8·83 m. (28 ft. 11 ins.) ; span, 14·25 m. (46 ft. 9 ins.) ; chord, 2 m. (6 ft. 7 ins.) ; wing area, 26 sq. m. (280 sq. ft.) ; area of tail plane, 3 sq. m. (32·3 sq. ft.) ; area of elevators, 1·8 sq. m. (19·4 sq. ft.) ; area of fin, 0·36 sq. m. (3·9 sq. ft.) ; area of rudder, 0·7 sq. m. (7·5 sq. ft.). The weight empty is 750 kgs. (1,650 lbs.), and the useful load 450 kgs. (990 lbs.), giving a total loaded weight of 1,200 kgs. (2,640 lbs.). The wing loading is, therefore, 9·43 lbs./sq. ft., and the power loading, assuming 120 h.p., 22 lbs./h.p. Speed tests over a measured course have not yet been carried out, but the estimated maximum speed of the machine is 160 kms. (100 m.p.h.). It is stated that the machine takes off after a run of approximately 50 yds., and that it climbs and handles well. Further tests are now being carried out.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS.

ANNUAL GENERAL MEETING

THE Annual General Meeting of the members of the Royal Aero Club of the United Kingdom will be held on Monday, March 31, 1924, at 3, Clifford Street, London, W. 1, at 5 p.m.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than 21 days before the meeting, and must be signed by at least five members.

Committee

In accordance with the Rules the Committee shall consist of 18 members. Members are elected to serve for two years, half the Committee retiring annually.

Retiring members are eligible for re-election.

The retiring members of the Committee are :—

Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F.
Maj.-Gen. Sir W. S. Brancker, K.C.B.
Ernest C. Bucknall.
G. B. Cockburn.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. M. O'Gorman, C.B.
Air Commodore C. R. Samson, C.M.G., D.S.O., R.A.F.
Sir Mortimer Singer, K.B.E.

Any two members of the Club may nominate a member to serve on the Committee provided the consent of the member has been previously obtained. The name of the member thus nominated, with the name of his proposer and seconder, must be sent in writing to the Secretary not less than 14 days before the Annual General Meeting.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

CAMBRIDGE UNIVERSITY AERONAUTICAL SOCIETY

As may be seen from this term's Lecture List, which we give below, the Society is promised some interesting papers for the present term :—

February 13.—Commander C. D. Burney, C.M.G., R.N., M.P. : "Airships in Relation to Imperial and Commercial Problems."

February 20.—Professor B. Melvill Jones, M.A., A.F.C. : "The Control of Aeroplanes."

February 27.—Mr. W. Sholto Sheppard : "A New Type of Commercial Aircraft."

March 5.—Cinematograph films, etc.

March 12.—Major J. H. Ledeboer, M.B.E. : "Safety Precautions in Aeroplanes."

Date to be announced later.—Mijnheer A. H. G. Fokker : "Recent Developments in Aviation."

Hon. Sec., BASIL B. HENDERSON,
Gonville and Caius College,
Cambridge.

AIR MAILS

Committee's Interim Report Not Hopeful

THE Committee of three, appointed "To consider the present arrangements for air mails and the possibilities of improving and extending them and the co-ordination of the work of the General Post Office and the Air Ministry in connection therewith," has just issued an Interim Report, published by H.M. Stationery Office (Cmd. 2038), price 6*d*. net, under the title "Interim Report of the Air Mails Committee." The Committee consisted of Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Chairman, Maj.-Gen. Sir W. Sefton Brancker, K.C.B., A.F.C., Director of Civil Aviation, and Brig.-Gen. F. H. Williamson, C.B., C.B.E., Director of Postal Services. The Interim Report is divided into three fields, covering (I) European (cross-Channel) services, (II) Imperial services, (III) internal services. There are two appendices to the Report, the first giving statistics relating to the Continental air mail services, and the second a brief report on the Plymouth-Manchester-Belfast experimental air mail service.

The first part of the Report contains a brief outline of the history of the cross-Channel air mail services, beginning with the early experiments in 1919 and onwards up to the latest extensions to Cologne. Reference is made to the procedure to be followed in posting letters for transmission by air, and it is stated that "The reasons for the disappointingly small traffic must be sought in conditions which are inherent in the nature of the services in question, and cannot be removed by any improvement in organisation." Most important among these conditions, the Report states, is the comparative shortness of the existing routes between England and the Continent, on which there is considerable loss of time in ground conveyance. The services are also handicapped by the fact that as yet night flying is not practicable. It is pointed out that a letter posted in London at the end of a business day is delivered in Paris by the first delivery the following morning when sent by ordinary train and steamer service. Nothing would, therefore, be gained by sending the letter by air. When allowance is made for ground conveyance at each end, the elapsed time between posting in London and delivery in Paris is about five hours, and the latest time at which a letter can be posted in London for delivery in Paris during business hours on the same day has been fixed at 11 a.m. But business letters are not posted in any considerable quantities before that hour, and it results that the London-Paris air service is in effect a service designed for specially urgent letters, for which the ordinary routine of posting in the afternoon and delivery next morning does not happen to be suitable. It is noteworthy, the Report states, that the proportion of air mail letters for Paris which are also prepaid with a special fee for express delivery is very much higher than the proportion of express letters in the ordinary service. In the case of letters posted in the provinces, or posted in London for places beyond Paris, a greater advantage is offered; but it appears from experience to be insufficient to attract any considerable amount of traffic to the air route.

Although the Report points out that air mails are handicapped by the present impracticability of night flying, it is stated that even when night flying becomes practicable, an air route which can be flown in two or three hours will still be of little use for correspondence between its terminal points, for the obvious reason that there is no advantage in substituting an arrival of mails by air at midnight for an arrival by train at 5 or 6 a.m. "So far," the Report continues, "as this terminal correspondence is concerned the advantage offered by night flying—and it will, of course, be a very important one—will be that it will enable letters for towns 800 miles or more from the starting point of an air service to be posted at the end of a business day and delivered at the beginning of the next. It will, for instance, bring Berlin postally as near to London as Paris already is."

The Report then goes on to point out that an air mail service is not limited to conveying correspondence exchanged between its terminal points, and states that "The proper function of an air service such as those now under consideration is to be a link in a chain of communication of which the train or the steamer also makes a part. In a combination of this kind the maximum advantage will be gained on a route made up of a whole day's flight both preceded and followed by a whole night's rail or sea transit."

The Report then refers to what, it is considered, may prove to be an important development, *i.e.*, the conference held at The Hague in November last, when representatives of Great Britain, Holland, Germany, Denmark, Norway and Sweden met to discuss the establishment of an air service between Rotterdam and Malmö, working in connection on the one side with the night train and steamer service between London and Rotterdam, and on the other side with the night train services between Malmö and Stockholm and Christiania. It is stated that this service will make it possible for a letter posted in London at the close of a business day to be delivered in the Norwegian or Swedish capitals in the morning of the next day but one, a gain of 24 hours over the ordinary route. It is pointed out that this proposed air service will not touch Great Britain, and that no gain could be expected by using Croydon as one of its terminal points, since one night would be lost between posting and despatch in London, and letters to London would lose one night between arrival and delivery. "On the other hand," the Report continues, "a service starting from and ending at Croydon might offer advantage for letters for and from the big provincial centres, and it is possible that such a service may later be established in addition to the projected Rotterdam-Malmö service."

The Report then states that air services cannot hope, under present conditions, to become the normal agencies for the conveyance of mails in bulk between this country and the Continent, partly on account of the relatively high cost and partly owing to the liability to disturbances in the winter months, a liability which, it is stated, would necessitate having an alternative service ready to step in at any time, which would, it is claimed, greatly increase the cost. The Committee does not regard the transfer of mails in bulk to air routes as practicable in present conditions, and until there has been some radical change in conditions, the relation of the Post Office to an air company should be, as it has been hitherto, "that of any other customer with goods to be carried.

The principles outlined in above paragraph were, it is stated, put forward by the representative of the British Post Office [Gen. Williamson—ED.] at The Hague conference and met with general acceptance, so that they may be said to embody the views on air mail policy of an important group of Continental countries.

The remarks in the first part of the Report relate primarily to letter mails. In the case of parcel mails, which do not normally obtain the advantage of the most rapid means of communication, and are sometimes subject to heavy Customs delays, the Committee is somewhat less pessimistic. It is stated that the air parcel services to Paris now convey about 2,000 lbs. of parcels per month, and that in this case there is a gain of four days or more in time. The service between this country and Holland conveys nearly 1,000 lbs. a month in the outward direction. The Cologne-London service (inward only) is stated to have proved very useful to the Army on the Rhine during the dislocation of railway services in the Cologne district, and the Committee believe that "if the cost of air transport can be substantially reduced, air services are capable of becoming an important agency for the transport of urgent parcels between England and Continental countries."

The conclusions reached by the Committee on this part of the Report (*i.e.*, European (cross-Channel) services) are summed up as follows:—

"(*a*) The existing air mail services between England and the Continent are, so far as letter mails are concerned, in the nature of express services, and cannot expect to obtain more than a small fraction of the traffic. For parcel mails they offer wider, though still limited, possibilities.

"(*b*) The right line of development for letter air mail services to and from the Continent is to be found in combination with train and steamer services working by night.

"(*c*) For letters posted in or addressed to London, the most useful air services will be those which start from and end at air termini on the Continent at the distance of a night's train and steamer journey from London. Services starting from and ending at Croydon will be of use primarily for provincial correspondence (which is more than half of the total Continental correspondence of the country).

"(*d*) The only practical policy for the Post Office, at any rate in the absence of night flying and of complete reliability of air services at all times of the year, is to maintain the present system, under which no letter is sent by air unless it is marked by the sender for air transmission and prepaid with a special fee. The development of aviation should, however, be closely watched, and every opportunity should be taken to improve the air mail service."

Imperial Services

The next section of the Report deals with Imperial Air Services. On this subject the Report states that schemes have been put forward from time to time for the use of aeroplanes, working in connection with steamer services to and from Great Britain, to carry mails between the West Indian Island and between Aden and Mombasa. It is pointed out that a cardinal weakness, from the postal point of view, of such schemes is that they deal with areas which demand air transport over very long distances, but with which no very large amount of correspondence is exchanged. With reference to the French aeroplane service between Toulouse and Casablanca—about 1,000 miles apart—it is stated that the service is now carrying letters at the rate of about 3,000,000 a year, but it is pointed out that the conditions obtaining are unlike any which exist within the British Empire.

The Committee takes as an illustration of the possibilities of a service which provides rapid transit from a country on one of the main lines of steamship communication to a remote and not highly developed territory the existing air mail service between Cairo and Baghdad, and the Report states that the conditions in this case were perhaps uniquely favourable. The saving in time is very considerable, eight or nine days between London and Iraq as compared with the 27 to 30 days taken by the older service *via* India. With a special fee of 6*d*. per oz. about 30 per cent. of the first-class mail for Iraq was attracted to the air service. The revenue from air fees amounted to as much as £9,000 a year. It is, however, pointed out that the air service has not been run on a commercial basis, being maintained by the Air Ministry principally for strategic reasons, and no attempt having been made to equate revenue with cost. The Report also states that the new weekly motor service across the desert offers practically the same acceleration for Iraq mails as the fortnightly air service, and that in spite of the reduction of the air fee to the same as that charged by the motor service, *i.e.*, 3*d*. per oz., the air route has already lost a great deal of traffic. The Committee considers that if the route were handed over to a commercial company services would be operated weekly or even bi-weekly, the through journey being made in one day, with the natural consequence that the volume of mail would be increased, but points out that in any case such a service would cater for the carriage of parcels, goods and passengers, and would therefore rely on the Post Office for only a portion of its receipts.

A somewhat different position obtains, the Report continues, when postal communication between Great Britain and the Dominions and India is considered. Here, on the trunk lines of Imperial communication, there are, it is stated, vast quantities of mail to be transported, and a sensible reduction of the transit time would be of great political and commercial importance. The question of Imperial Air Mail Services was referred, in 1922, to the then newly-formed Civil Aviation Advisory Board, which in its first report (published in 1922, Cmd. 1739) presented alternative schemes for an air mail service from Great Britain to India *via* Egypt or Constantinople and Baghdad. [A *résumé* of that report was published in FLIGHT of August 17, 1922—ED.]. In the C.A.A.B. report the cost of a weekly service was estimated under various schemes at figures ranging from £268,000 to £354,000 a year. The present Report states that "These figures were put on the high side when the Report was drawn up, and experience since gained has proved that a considerable reduction could be effected." The maximum revenue likely to be obtainable was put at about £65,000 a year, and the C.A.A.B. schemes showed a saving of 6½ days between London and Bombay. Thus an aeroplane service to India which would reduce the time taken by nearly 50 per cent. could count on covering about one-fifth only of its annual expenses out of postal revenue. The present Report states that this is far from being sufficient to justify, on any commercial basis, the establishment of an air service for which mail-carrying would be the main consideration.

The whole question of Imperial air mails has, the Report continues, been put on a different plane by the recent acceptance in principle by the late Government of the Burney airship scheme. It is pointed out that the Government has not committed itself to the use of the airship service for mails to any predetermined extent, but that when the service has been established and has proved reliable facilities for sending letters by it will be offered to the public, the special air fee being fixed at the lowest rate that will enable the Post Office to pay the operating company whatever remuneration it requires for conveyance of mails. The service will, it is stated, offer an acceleration of about four days to Egypt and about 10 days to India. Transmission of mails to and from Australia will also be considerably accelerated by the use of the air route to and from India. The volume of mail on this route is very large, and is stated in the Report to be upwards of 14 tons of letters and post-cards, and 120 tons of printed matter and samples per week from Great Britain to Egypt, India and Australia. There will, therefore, be ample scope for the air service as an addition to the existing means of transporting mails. The wider question of using the airship service as the normal agency for the transport of the whole of the letter mails for places on this route can, the Report states, well be left for consideration until the possibility of maintaining an absolutely regular service has been demonstrated in actual working. The Committee considers it possible that the successful establishment of the airship service will afford scope for "spur" services by aeroplane to points at some distance from its route, *e.g.*, from Egypt to East and West Africa, and from the Indian terminal point to Calcutta, Delhi or Madras.

Reference is made in the Report to a scheme put forward by Brig.-Gen. Spears, M.P., and Commandant Faure for a combined Anglo-French aeroplane mail service to India. This scheme suggests that a French air service should cover the distance from Marseilles to Alexandretta in 30 hours, flying day and night, and that a British service should continue from Alexandretta to Bombay. The scheme claims a service from London to Bombay in four days. The Report, however, states that "In view of the acceptance of the Burney scheme, we have not thought it necessary to give detailed consideration to the proposal for an aeroplane service."

On the subject of Imperial air services the Committee has come to the following conclusions:—

"(*a*) At the present stage of development the most hopeful field for Imperial air mail services on a commercial basis is to be found along the main lines of Imperial communication, not on bye-routes to outlying and commercially unimportant territories.

"(*b*) The adoption of the Burney airship scheme reduces the importance of urgent consideration at the present time of an aeroplane service on the route between Great Britain and India.

"(*c*) The value of the Burney service for mails will be tested by its use for specially prepaid correspondence, and the question of transferring mails in bulk from the sea to the air route is one for later consideration."

Internal Air Services

On the subject of internal air services the Committee states in the Interim Report that "The most favourable, or the least unfavourable, opportunity for an internal air mail arises where the intervention of a stretch of sea slows down the working of the ordinary service. Cases in point are the services between England and the Channel Islands, and between England and Ireland. The first of these has not a sufficient volume of correspondence to make it of much potential importance; but for what mails there are from the Channel Islands an air service could be of use, as the inward mail steamers leave for the mainland in the morning. In the outward direction the voyage is made by night, and there is thus no useful opening for an air mail which, as things are, must go by daylight." On the Great Britain–Ireland route there is, the Report states, a considerably greater volume of mails to be handled, but the possibilities are strictly limited. It is stated that a letter posted in London up to 3.30 p.m. is delivered in Belfast at or soon after 7.30 a.m, on the following day. For the next delivery in Belfast, commencing at 10.45 a.m., the latest time of posting is 5.30 p.m. in London. In the inward direction the case is stated to be slightly better, as a letter from Belfast does not secure first delivery on the day after posting, in Birmingham or London, although it can in Manchester if posted before 5.45 p.m. An afternoon air service from Belfast to Manchester would secure first delivery over a large part of England, including London, for letters posted in Belfast early in the afternoon. The Report states that the establishment of such a service by private enterprise is understood to be under consideration.

Reference is also made to a projected service between Belfast and Glasgow. Such a service, the Committee considers, would no doubt be of some use, and would be analogous to the London-Paris service, "and would probably attract about the same percentage of traffic." On the subject of transmission of overseas mail after arrival in this country the Committee considers that a certain amount of acceleration could be effected. For example, mails arriving in London from the Continent in the early morning could be distributed

by air at places as far distant as Glasgow, Edinburgh or Belfast in time to be dealt with during business hours of the same day. Similarly letters for despatch overseas by the night mail could be forwarded by air from the provinces at a considerably later hour than is possible at present. The Report then refers to the Plymouth air mail experiments, which, it is stated, "as originally put forward were based on a misapprehension of the actual working of the mail service. There is no regular arrival of American mails at Plymouth early on Friday morning. The only American mails which are landed at Plymouth are brought by American and other ships (generally slow in comparison with the British liners) which may arrive on any day and at any time of the day. The British contract mail steamers do not call at Plymouth, either on the inward or on the outward journey, nor is there any reason to suppose that they would call there even if facilities were provided for the transmission of mails by air between Plymouth and business centres in Great Britain and Ireland."

It was found that an air mail service for carrying the American mails onwards from Plymouth could not be expected to be of use in connection with more than 50 per cent. of the arrivals. Nevertheless, it was decided to give such a scheme a trial, and consequently the services of the De Havilland Aircraft Co. were obtained to carry out flights from Plymouth for a period of one month. A new route was tried—from Plymouth to Belfast, with an intermediate call at Manchester. The results of the experiments are given in an appendix to the Report, and it has been demonstrated that the route is practicable even under unfavourable weather conditions. The Committee states that it has been demonstrated that such a service, working in connection with the arrivals of American mails at Plymouth, might accelerate the delivery of mails at Manchester in four cases out of seven, and at Belfast in about four out of five. It is pointed out, however, that the success of such a service would depend upon making its advantages known in America, and upon the willingness of the U.S.A. Post Office to co-operate. The Committee's conclusions on the subject of internal air mail services are summarised as follows :—

"(*a*) There is very little scope for internal air mail services in present conditions, and the introduction of night flying would not increase it to any material extent.

"(*b*) An internal air mail service designed to accelerate the onward transmission of mails from abroad after landing at a British port requires conditions which are not fulfilled in the case of American mails landed at Plymouth. These conditions are :—

"(1) The speediest possible transmission by sea ; and

"(2) A more or less regular arrival, preferably in the early hours of the morning."

Future of the Committee

In conclusion the Report states that the Committee has presented an Interim Report because it is regarded as being possible that the Committee may be expected to continue in being and to present further reports from time to time. Much seems to depend upon the future of the Civil Aviation Advisory Board. If that Board is to be revived its field will presumably include any question that could usefully be referred to the present Committee of three. Finally, the Report concludes :—

"In this connection we would refer particularly to the concluding words of our terms of reference, which speak of 'co-ordination of the work of the General Post Office and the Air Ministry in connection' with air mails. We have not found lack of co-ordination between the work of these two Departments ; but a small Committee such as this, including one representative of each Department with a Chairman who is outside both, seems to us to afford a convenient opportunity for the exchange of views which are necessarily formed to some extent from different angles."

Those Stolen Secret Plans

A THRILLING drama—in true "movie" style—has been in the Press early this week. It was reported that some important designs of a new aero engine—which was going to revolutionise aviation—had been stolen from the Breguet works. However, the Breguet firm had previously been warned, and the thief, a French engineer employed at the works, was caught with the documents on his person as he was leaving the factory, and was thereupon arrested. Further enquiries led to the arrest also of a young (and beautiful ?) Russian girl and an engineer-fitter, likewise Russian, from a rival aircraft firm. It is not yet certain whether this deed is the work of the German, Russian or Hottentot Governments.

Fatal Aeroplane Accidents

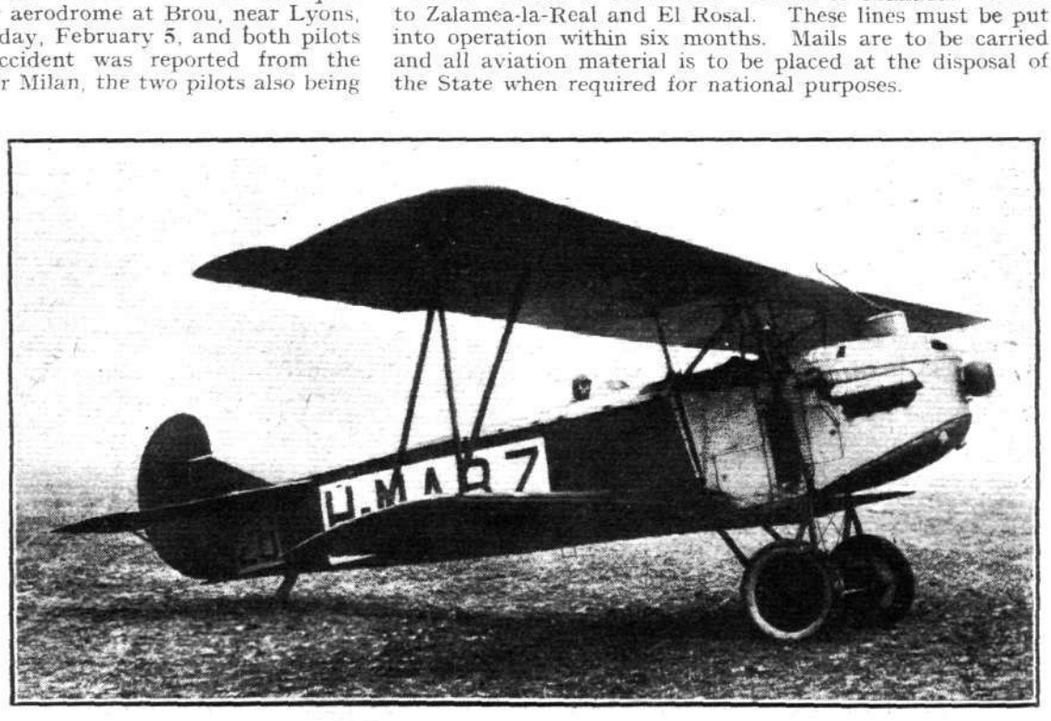
SEVERAL fatal aeroplane accidents during the last few days are reported from the Continent. Two Nieuport machines from the military aerodrome at Brou, near Lyons, collided in mid-air on Tuesday, February 5, and both pilots were killed. A similar accident was reported from the Cinisello Flying School, near Milan, the two pilots also being killed. On Saturday, February 9, two airmen were killed at Evère aerodrome, near Brussels, their machine falling from about 500 ft. owing to engine failure.

London-Manchester Service to be Resumed

WITHIN a week or so the Daimler Airway Co. will resume the London-Manchester service, which was suspended a few weeks back. A new D.H. 34 (Napier "Lion") which is receiving its finishing touches at the De Havilland works will be used on this route.

Air Lines in Spain

CONCESSIONS have recently been given for five new air lines in Spain, a condition being that all technical staff and pilots must be of Spanish nationality, foreigners only being admitted should the number of national pilots be insufficient. The proposed air routes are as follows : San Sebastian to Madrid, Seville, Cadiz and the Canary Islands. Bilbao to Barcelona. Seville to Granada. Seville to Zalamea-la-Real and El Rosal. These lines must be put into operation within six months. Mails are to be carried and all aviation material is to be placed at the disposal of the State when required for national purposes.



New Altitude Record : This Fokker Biplane, with Napier "Lion" engine, has reached a height of 6,470 metres (21,227 ft.) recently in the Argentine. The previous record for a machine carrying useful load of 500 kg. was 5,992 m.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

NOTICES TO AIRMEN

Holland: Air Traffic Regulations and Officially Defined Routes

1. *Air Traffic Regulations.*

In order to promote safety in air traffic the following regulations have been made by the Netherlands Government :—

(1) In the case of aircraft following an officially recognised air route, the said aircraft on such portions of the route as are defined by a definite ground line (railway, river, canal, main road, coast line, etc.), shall keep at least 100 metres to the right of such line and parallel thereto.

(2) Similarly, an aircraft which, though not following an officially recognised air route, follows a definite ground line over a certain portion of its route, shall, so far as possible, keep at least 100 metres to the right of such line, and parallel thereto.

(3) In the case of an aircraft following an officially recognised air route finding itself on a part of such route which is not defined by a definite ground line, but which is defined by an imaginary straight line between fixed points, the aircraft shall endeavour to keep some hundreds of metres to the right of such line and of such points.

(4) Should the pilot of an aircraft deem it necessary to cross from the right side to the left side of an officially recognised air route, he must cross the route at right angles and as high as possible. Flight should not be resumed on the left side of the route in a direction parallel thereto until the aircraft is at least 10 kms. distant from it.

(5) Similarly an aircraft which has to cross from the left side to the right side of an officially recognised air route shall cross at right angles and as high as possible.

(6) When an aircraft is flying below low cloud it shall keep as low as possible below the cloud base in order to see and be seen.

2. *Officially Defined Air Routes*

The following air routes have been officially defined by the Netherlands Government in order that they may be followed by aircraft engaged in civil air traffic whenever the pilot considers it desirable.

Pilots are *under no obligation* to follow an officially defined route, but whenever such a route is being followed the general air traffic regulations set out above must, in so far as they are applicable, be strictly observed.

N.B.—In the absence of definite ground lines (rivers, canals, railways, main roads, etc.), the indication of an officially recognised air route by means of such ground lines is impossible. Consequently, in so far as such ground lines are suitable for defining the air route, these are given, the remainder of the route being indicated by the names of points over which aircraft should fly.

(1) *Amsterdam-Rotterdam-London and vice versa (Netherlands section).*

(*a*) *Amsterdam to Rotterdam.*—Schiphol Aerodrome. W. of the Ringvaart (Ring Canal) on the Haarlemmermeer-polder to the Kruisweg. Above Westeinder Plas. Above Braassemer Meer. Above Koudekerk on the River Oude Rijn (Old Rhine), W. of the Heimansweg. W. of River De Rotte as far as the railway bridge over the De Rotte, on the northern edge of the town of Rotterdam (railway running E. by N., W. by S.). Waalhaven Aerodrome.

(*b*) *Rotterdam to Amsterdam.*—Waalhaven Aerodrome. E. of River De Rotte, from the railway bridge over the De Rotte, on the northern edge of the town of Rotterdam (railway running E. by N., W. by S.). Above Alphen Station on the River Oude Rijn (E. of the Heimansweg). Above the Noordeinsche-polder. E. of the Westeinder Plas. E. of the Ringvaart (Ring Canal) on the Haarlemmermeer-polder. Schiphol Aerodrome.

(*c*) *Rotterdam to the frontier at Retranchement.*—Waalhaven Aerodrome. W. of the River Het Spui. W. of Middelharnis harbour. W. of Herkingen point (Oude Herkingen-polder). Above Dreischor (W. of the Dijkwater). W. of Zierikzee and Zierikzee new harbour. W. of Colijnsplaat. W. of Wissekerke landing ground (*vide* Notice to Airmen No. 29 of 1923). W. of Oude Middelburg harbour (approximately 2 kms. S.S.E. of Veere). W. of the Veere-Middelburg-Vlissengen (Flushing) canal, as far as the bridge on the northern edge of the town of Vlissengen. N. of the Nieuwe Sluis lighthouse (1½ miles W. by N. of fort Frederik Hendrik). Along the coast W. of the Waterline (*i.e.*, to seaward) to the Sluische Gat or Zwin.*

(*d*) *The frontier at Retranchement to Rotterdam.*—From the Sluische Gat or Zwin along the coast E. of the waterline (*i.e.*, to landward). Above fort Frederik Hendrik. E. of the Vlissengen (Flushing)-Middelburg-Veere canal (from the bridge at the northern edge of the town of Vlissengen. E. of the Wissekerke landing ground (*vide* Notice to Airmen No. 29 of 1923). E. of Colijnsplaat. E. of Zierikzee new harbour and Zierikzee. Above Sir Jansland, E. of the Dijkwater. E. of Herkingen point (Oude Herkingen-polder). E. of Middelharnis harbour. E. of the river Het Spui. Waalhaven Aerodrome.

(2) *Amsterdam-Berlin, via Bremen or Hanover and vice versa (Netherlands Section).*

(*a*) *Amsterdam to the frontier at Denekamp.*—Schiphol Aerodrome. S. of Abcoude. Above Overmeer (at which point the river Vecht is crossed). S. of the railway junction at Hilversum. Following on the S. side of the railway line Hilversum-Baarn-Amersfoort-Apeldoorn-Deventer-Almelo. Along the S. bank of the Almelo-Nordhorn canal.

(*b*) *The frontier at Denekamp to Amsterdam.*—Along the N. bank of the Almelo-Nordhorn canal. Following on the N. side of the railway line Almelo-Deventer-Apeldoorn-Amersfoort-Baarn-Hilversum-Bussum (as far as the water tower S. of Bussum). Above Bussum landing ground (*vide* Notice to Airmen No. 56 of 1922). Above Hinderdam (at which point the river Vecht is crossed). N. of Abcoude. Schiphol Aerodrome.

(3) *Rotterdam-Berlin, via Bremen or Hanover and vice versa (Netherlands Section).*

(*a*) *Rotterdam to the frontier at Denekamp.*—Waalhaven Aerodrome. Following on the S. side the railway line Rotterdam-Gouda-Utrecht-Amersfoort-Apeldoorn - Deventer-Almelo. Along the S. bank of the Almelo-Nordhorn canal.

(*b*) *The frontier at Denekamp to Rotterdam.*—Along the N. bank of the Almelo-Nordhorn canal. Following on the N. side the railway line Almelo-Deventer-Apeldoorn-Amersfoort-Utrecht-Gouda-Rotterdam.

(4) *Rotterdam-Brussels-Paris and vice versa (Netherlands Section).*

(*a*) *Rotterdam to the frontier at Esschen.*—Waalhaven Aerodrome. W. side of the steam tramway, from a point 2 kms. E. of Oud-Beierland to Numansdorp. W. of Willemstad. W. of the bridge over the Dintel at Stampersgat. Along the W. bank of the straight part of the Nieuwe-Roosendaalsche Vliet running N.-S. Following on the W. side the railway line Roosendaal-Esschen railway line.

(*b*) *The frontier at Esschen to Rotterdam.*—Following on the E. side the railway line Esschen-Roosendaal as far as Roosendaal station. Following on the E. bank the Nieuwe Roosendaalsche Vliet as far as the point at which it bends off in a N.W. direction. E. of the bridge over the river Dintel at Stampersgat. E. of Willemstad. Following on the E. side the steam tramway from Numansdorp as far as a point 2 kms. E. of Oud-Beierland. Waalhaven Aerodrome.

No. 8 of 1924.

* The question of the point on the frontier where the air route enters Belgian territory is still under consideration, hence the information regarding this portion of the route must be regarded as provisional.

Air Routes in India

WITH a view to being prepared with information in regard to landing grounds on various air routes in India—especially in the event of the Burney airship scheme materialising—the Government of India has decided to take immediate action. Two officers of the Royal Air Force have been lent to the civil authorities in order to make a survey of the following air routes :—Karachi-Delhi, Delhi–Bombay, Calcutta–Bombay, Allahabad-Calcutta, and Calcutta–Akyab–Rangoon. It is stated that the advantages of an air service between Calcutta and Burma, which can be carried out during daylight, are so great that when the financial position has improved, this line will probably be the first to be opened up, whatever may be the result of the Burney scheme.

New Air Lines for Switzerland

THE Swiss Air Office is examining the proposals of several aerial companies to establish new international air services passing through Switzerland and using Basle, Berne and Zurich as air ports. Arrangements are also being made to establish a Lyons-Geneva and Lausanne air service.

AEROPLANE PERFORMANCE ESTIMATES

[THE paper under above title, read by Mr. R. Chadwick, Chief Designer to A. V. Roe and Co., before the Institution of Aeronautical Engineers on February 8, 1924, was of more than ordinary interest, forming as it did a veritable text-book on the subject of aeroplane performance estimates. While it is true that Mr. Chadwick did not introduce any new methods, his explanation of the various procedures followed in estimating the performance of an aeroplane was so clear as to be easily understood by almost anyone, and perhaps the greatest merit lay in the compilation of *average* figures for weights, air resistances, etc., of a number of items. The lecturer was careful to point out that, like all averages, these figures did not always hold true, especially if radical departures were made from orthodox design. Nevertheless such figures are of the very greatest assistance in preliminary estimates, and it is for this reason that we have chosen, out of the 35 illustrations, six sets of curves which seem to us to be of such everyday utility as to deserve to be widely known. We should have liked to publish Mr. Chadwick's paper in full, but to do so would have required several issues of FLIGHT. We have, therefore, had to be content with publishing these six graphs, and the brief *résumé* of the paper which follows. It is to be hoped that the Institution of Aeronautical Engineers will be able to publish Mr. Chadwick's paper in full in their Minutes, complete with all the illustrations, since the paper—as we have already mentioned—would form an excellent text-book on the subject, especially suitable for those who have not the opportunity of doing performance calculations in the ordinary course of their duties, but who are interested in the subject and wish to be able to carry out such calculations should the necessity arise.—ED.]

The Three Methods

THE lecturer pointed out that there are three methods in general use for estimating the probable performance of a new aeroplane design. The first consisted in predicting the performance from formulæ or graphs obtained by averaging the performance test results of a large number of aeroplanes. The second method consisted in estimating the performance by calculating the wing lift and drag from model tests, and the drag of the remainder of the aeroplane from tests on component parts. The propeller efficiency also had to be calculated, and the performance obtained from the resulting values for h.p. required and h.p. available at all speeds within the flying range. The third method was to calculate the performance from the results of tests in the wind tunnel on a complete model of the proposed aeroplane. The lecturer pointed out that the first method was generally employed for making a preliminary estimate, and was particularly useful when considering the possibility of meeting a prospective purchaser's requirements. By the first method a close approximation could be made to the probable performance without the necessity of preparing any drawings, while the graphs used were also useful in considering the effect on performance of an existing aeroplane of varying the load carried. The second method was more laborious, and was usually employed to make a detailed estimate when the design had been more or less settled. The third method was not frequently resorted to unless the proposed design was a considerable departure from the average type. This method was also expensive, and it took a considerable time before the model test results were available.

Weight Estimates

Mr. Chadwick then proceeded to illustrate the two first methods by working out a numerical example, assuming that certain figures relating to useful load, range, maximum and minimum speed, etc., were furnished, to which the designer had to work. First of all it was necessary to be able to estimate the total loaded weight of the machine, and in order to enable this to be done the lecturer showed slides giving weight of honeycomb radiators, tanks, struts, propellers, oleo undercarriages, etc. Unfortunately, we have not the space to reproduce these curves, valuable as they are. The weight of aeroplane components as percentage of the gross weight was given in another slide, and this is summarised as follows, it being clearly understood that the figures given are *averages*: Wings, complete with bracing, 15 per cent.; tail, elevators, rudder and fin, 2 per cent.; undercarriage and tail skid, 4 per cent.; body, with engine mounting, seating, etc., 11·25 per cent.; machine and engine controls, 0·75 per cent.; total structure weight, 33 per cent. Engine, 18·5 per cent.; radiator, shutters and cowling, 2·75 per cent.; cooling water, 2·75 per cent.; fuel and oil tanks, 3 per cent.; piping, cocks, pumps, etc., 0·5 per cent.; propeller, 2·5 per cent.; starting gear for engines, 0·5 per cent. Total power plant weight, 30 per cent. Total bare weight as percentage of gross weight, 63 per cent. The lecturer gave the following average figures of weights in lbs./h.p.: Water-cooled engines, 2·5; air-cooled engines, 2·33; water-cooled engine accessories, 1·0; twin water-cooled engine accessories, 1·25; air-cooled engine accessories, 0·383; water-cooled engines and accessories, 3·5; twin water-cooled engines and accessories, 3·75; air-cooled engines and accessories, 2·7; the engine accessories include radiator and shutters, cooling water, piping, cocks for fuel, oil and water, exhaust pipes, pumps, starting gear, propeller. Fuel and oil tanks are *not included*, as these vary with the duration of flight. The weight as percentage of engine weight of accessories was given as follows: Water-cooled engine accessories, 43 per cent.; twin water-cooled engine accessories, 47 per cent.; air-cooled engine accessories, 16 per cent.

Performance Estimates

Using the figures in the first five slides as a basis, Mr. Chadwick then arrived at an estimate of the total loaded weight of the machine taken as an example, and then proceeded to the actual performance estimates. In the six following slides (which are reproduced herewith) were shown data collected from a large number of performance tests on different aeroplanes. Fig. 1 (we have re-numbered the six illustrations) gives curves of wing loading—ranging from 5 to 11 lbs. per sq. ft.—with speed in m.p.h. on a base of power loading in lbs./h.p. As stated on the graph, the upper curve of each band refers to single-seat, single-bay machines, while the lower curve refers to two-seat, two-bay aeroplanes. The curves refer, of course, to machines of average proportions, and are affected by radical changes in wing section used, in wing bracing, and in general "fineness" of the machine. For biplanes of more or less normal proportions they should, however, give fairly accurate results.

In Fig. 2 are curves of absolute ceiling, "service" ceiling, *i.e.*, height at which the rate of climb is 100 ft./min., and rate of climb at sea level, are plotted on a somewhat unusual base; "combined loading," *i.e.*, wing loading in lbs./sq. ft. multiplied by power loading in lbs./h.p. Thus the "combined loading" of a machine having a wing loading of 7 lbs./sq. ft. and a power loading of 20 lbs./h.p. will be 140. The curves would probably not hold good for abnormal loadings, such as, for instance, if the figure 140 for combined loading were obtained from reversing the power and wing loadings. For normal loadings, however, they are probably extremely close to actual figures. The lecturer pointed out that the curves in Fig. 2 (and also in Fig. 4, to which reference will be made later) refer to R.A.F. 15 wing section, and that if a different aerofoil section was used an "equivalent wing loading" should be found for use with the curves. This "equivalent wing loading" was: Actual wing loading $\times \frac{k_L \text{ max. of R.A.F. 15}}{k_L \text{ max. of section used}}$. It is also assumed that if a different wing section is used it will have round about the same efficiency as R.A.F. 15, otherwise the curves will not apply. It should be pointed out that for the speed curve, Fig. 1, the *actual* wing loading should be taken.

Fig. 3 is a rate of climb chart for normal machines, in which a series of straight-line curves of "combined loadings" ranging from 53·2 to 188 are plotted on a base of rate of climb in ft./min. From these curves the probable rate of climb at any altitude can be found if the "combined loading" is known, and the rate of climb at ground level has first been ascertained from the curve in Fig. 2.

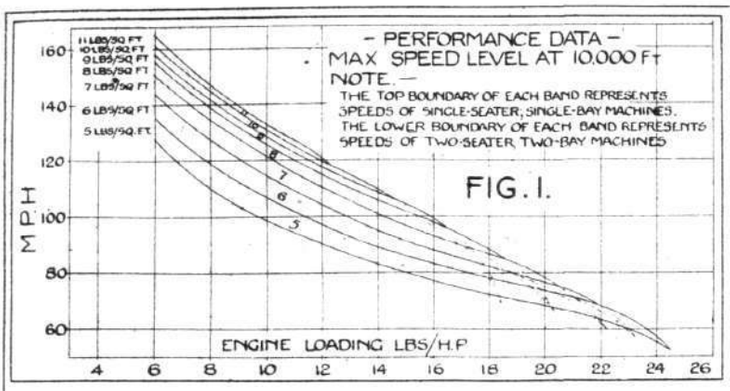
In Fig. 4, as already stated, it has been assumed that the wing section used is R.A.F. 15, and for other sections the "equivalent wing loading" should be found as explained above. The curves give the time to altitude for various "combined loadings" and sea-level rates of climb.

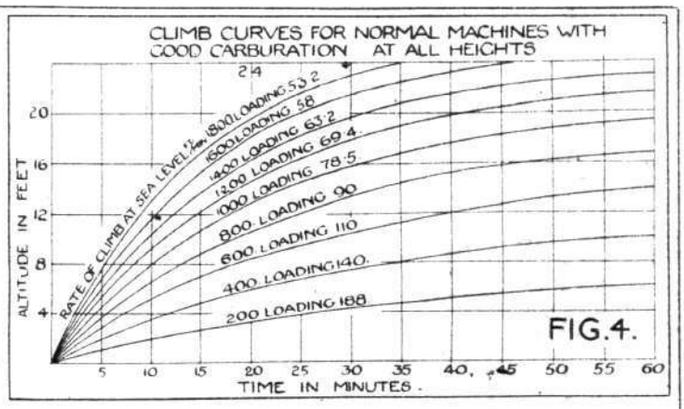
Fig. 5 gives a speed variation curve at various altitudes below the absolute ceiling of the machine. The use of this curve is explained by the note on the actual graph.

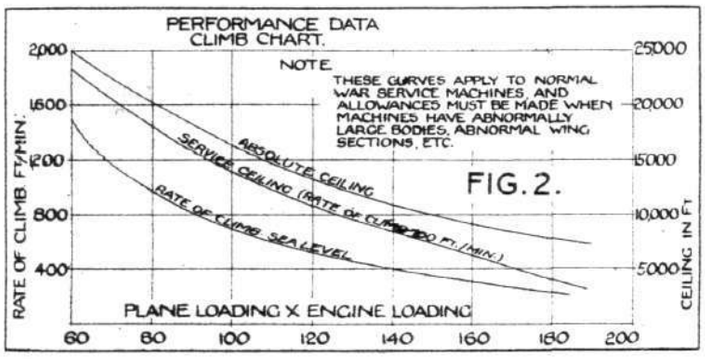
Finally, in Fig. 6 we have a series of curves for the rapid determination of landing speeds, or more correctly speaking stalling speeds. The lecturer pointed out that in designing for any given landing speed a slightly lower stalling speed should be allowed than specified maximum landing speed. The curves in Fig. 6 were, of course, obtained from the formula Weight $W = \text{lift} = k_L \rho A V^2$, from which landing speed $V_1 = \sqrt{\frac{W}{k_L \text{ max.} \times 0{\cdot}0051 \times A}} = \sqrt{\frac{\text{wing loading}}{k_L \text{ max.} \times 0{\cdot}0051}}$. In

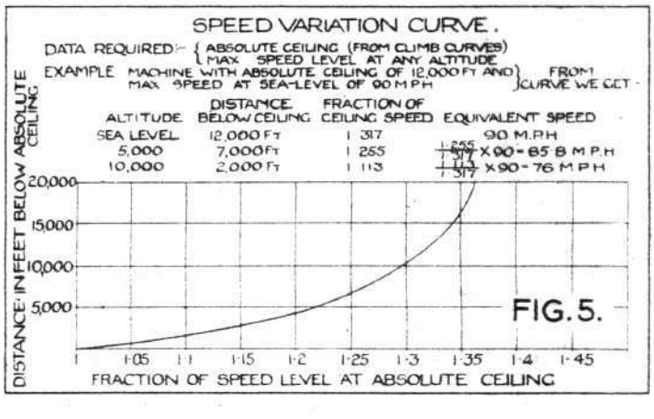
Fig. 6 curves of k_L max. ranging from 0·5 to 0·9 have been plotted, covering the range of maximum lift coefficients met with in ordinary aerofoils.

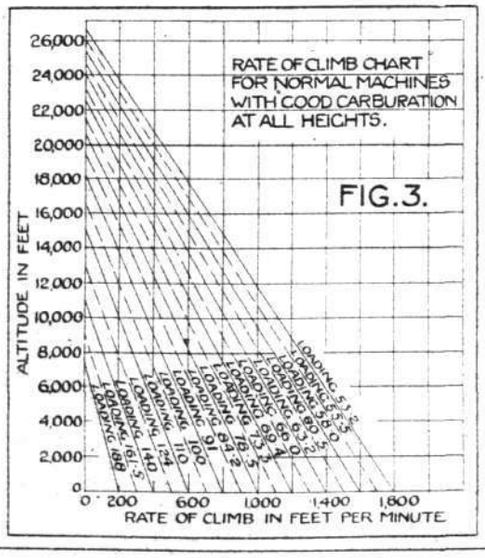
The next step in the performance estimates outlined by Mr. Chadwick was to calculate, for the machine assumed, the various performance figures, using the curves just described, and then, on the results obtained, to proceed with general arrangement drawings of a machine to fulfil the conditions. This completed the first method. Mr. Chadwick then worked out the performance figures in detail according to the second method, explaining the procedure as he went along. Unfortunately, we have not the space to follow the lecturer through the somewhat complicated calculations of this method, but it may be said that the procedure indicated was the usual one, based upon the assumption that it is sufficiently accurate to assume that the total resistance of an aeroplane is equivalent to the sum of the resistances of its component parts. It is, of course, well known that this assumption is not strictly correct, but as the lecturer stated, apart from the third method—of having a complete scale model tested in a wind tunnel—it is the best that can be done with our present knowledge of the subject. As we have already stated, we hope the paper will be published in full by the Institution of Aeronautical Engineers, when it will, we believe, be available to non-members of the Institution. We shall inform our readers as soon as the complete paper has been issued. In the meantime we congratulate Mr. Chadwick on the completion of what must have been a very arduous task, and one involving a very great amount of work. Especially do we thank Mr. Chadwick for having placed at the disposal of all interested the results of his long experience in work of this kind, which has enabled him to get out figures of weight and resistance of numerous components and to plot curves of averages which, if used with discretion and common sense, should enable almost any draughtsman to produce aeroplane performance estimates of quite a good order of accuracy.

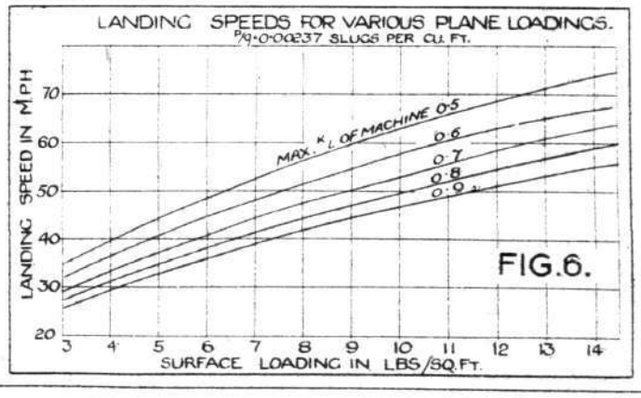












AEROPLANE PERFORMANCE ESTIMATES: Fig. 1 gives curves for estimating the speed of a normal machine when the wing loading and power loading are known or assumed. From Fig. 2 it is possible to predict the rate of climb and ceiling when the "combined loading," *i.e.* wing loading multiplied by power loading, is known. Fig. 3 is a "rate-of-climb-at-altitudes" chart for use when the rate of climb at sea level has been found; while Fig. 4 is a "time-to-altitude" chart. Fig. 5 gives the speed variation at various altitudes when the speed at ground level is known, and Fig. 6 enables the landing speed to be read off when the maximum lift coefficient of the wing section used and the wing loading are known. The figures relate to average machines, and for special types allowances must be made.

RADIAL AIR-COOLED ENGINES*

By R. FEDDEN

IN his introductory remarks the author referred to the early failings or misfortunes of the radial air-cooled engine—how it was ousted by the rotary, and how in 1918 the high-powered air-cooled radial engine gave promise of success, but failed to come up to expectations—which led to it getting a bad name. He further explained that in spite of this disparagement those who believed in the radial air-cooled engine continued their experimental work, with the result that this type of engine is now an accomplished fact, and must be reckoned with the best water-cooled engines of today, inasmuch as a 400 h.p. engine of this type is now produced weighing complete 25 per cent. lighter than the water-cooled type. He stated also that there is every possibility that the power-weight ratio of the air-cooled engine will be improved by a further 15 per cent. during the next 12 months.

He then proceeded to give the advantages of the radial air-cooled engine as compared with accepted types of "in-line" and "Vee" type water-cooled engines, which he set forth as follows:—

(*a*) *Weight Saving.*—He was strongly of the opinion that the aim of the aero engine designer must be first and always the further saving of weight, and that the school of thought in favour of more weight was unsound, because any increase in reliability obtained would only give such an engine a very limited use. Although several ingenious and interesting designs offering very low power-weight ratio had been put forward of recent years, he believed that certainly for powers up to 1,000 h.p. the static air-cooled radial offered by far the most promising field of exploration, and would do so until some revolutionary change was made from the present form of internal combustion engine.

(*b*) *The Elimination of Inertia Torque.*—The inertia torque on large engines due to the alternate acceleration and deceleration of the pistons and connecting rods, with the consequent rapid alterations of stress in the crankshaft, was one of the most radical defects in the ordinary "straight line" or "Vee" type aero engine. In multi-cylinder single row radials, owing to the connecting rods all coming on to one common crankpin, this serious trouble inherent to "in-line" engines was practically eliminated.

(*c*) Radial engines could be readily geared without interfering with the view of the pilot, maintaining the central axis for the propeller shaft, and also without meeting one of the main problems encountered when gearing down the propeller, viz., vibration due to inertia torque, which had been a prolific cause of the breakdown of many geared engines, so much so that certain forms of slipping clutch mechanism had been introduced to eliminate this trouble.

(*d*) The static air-cooled radial engine dispensed with the radiator, piping and water, with their attendant troubles. The failure of the water-circulating system on aero engines had by no means been eliminated; such troubles were still not infrequent, and had been responsible for an appreciable percentage of breakdowns. Corrosion was also a serious problem in the circulating system of aero engines. For military and naval purposes the elimination of water was important. On certain classes of machines it might be necessary to leave the ground or the deck of a ship within a few seconds of starting the engine. The air-cooled engine had great advantages over the water-cooled engine in this respect.

(*e*) In very hot climates such as Mesopotamia, air-cooled engines had been found to give far better service than water-cooled engines for the following reasons. An air-cooled cylinder would maintain full power if the mean temperature of the fins did not exceed 175° C. On the other hand, if the mean temperature of the cooling surfaces of a radiator exceeded 80° C., evaporation losses became considerable. Hence, in hot climates, where the air temperature might vary from 0° C. to 45° C., the temperature difference available for cooling might diminish 56 per cent. in the case of the radiator, whilst the diminution was only 25 per cent. in the case of the air-cooled cylinder. Whilst this difference would do no harm to the air-cooled cylinder, the water would boil away rapidly in the radiator of the water-cooled engine. Conversely, in very cold climates the air-cooled engine was even still more at an advantage.

(*f*) The static air-cooled radial could be made the shortest and most compact power unit it had up to the present time been possible to develop for an internal combustion engine working on the 4-stroke cycle. This advantage from the point of view of manœuvrability and saving of space was obvious, especially for military work; also the back plate of this type of engine afforded opportunity for neatly and compactly arranging the auxiliary drives, thus protecting them from damage and weather conditions.

(*g*) An examination of the large static radial from a manufacturing point of view would demostrate its great advantages in this respect. Nearly all the parts were symmetrical or round; there were no large difficult pieces to handle, or machine. A considerable proportion of the machining was in the form of large multiples. There was a fewer number of parts than in a "straight line" or "Vee" type engine of equal power and performance. It was believed that the production possibilities of the radial were not yet generally realised, and only when a really large production of this type of engine was required would there be the opportunity of demonstrating its manufacturing possibilities. Apart from the actual manufacturing facilities and ease of handling the parts, it was possible with a single row static radial to eliminate castings altogether, should the output warrant it.

There was also the important question of deterioration of aluminium castings from corrosion and sea water, and the author was of the opinion that the possibility of producing an aero engine, eliminating castings altogether and substituting light alloy drop forgings, opened up very great possibilities.

(*h*) With the exception of the rotary, the static air-cooled radial could be dismantled, overhauled and re-assembled much more quickly than any other type of engine. Recent maintenance figures, both from England and France, of proved water-cooled engines of high power, showed the very considerable amount of time inevitably necessary with this type of engine for dismantling and re-erecting. This item was quite apart from the actual time and cost of effecting any repairs. Examinations of valve timing, tappet clearances, carburettors, magnetos and top overhauls could be readily made on radial engines, and this work could be systematically and safely undertaken in less time than it took to prepare certain water-cooled installations for inspection. It was possible for two men to completely strip down ready for inspection a 400 h.p. radial air-cooled engine in eight hours, and to re-build in 15 hours; these figures were being attained regularly in the engine shops of the Bristol Aeroplane Co.

(*i*) Providing the aeroplane fuselage was suitably designed, the single row radial engine offered excellent opportunities for installation, no matter whether the engine was provided with a swinging mounting so that the back of the engine could be swung forward for examination and adjustment of the rear units, or attached to a pressed steel cone or tubular mounting. In either case the engine could be taken in and out of the machine in very much less time than was possible with an "in-line" or "vee" type engine.

The author next dealt with some of the special problems peculiar to the static air-cooled radial worthy of consideration, and which had been responsible for failure in the past. These he classified as follows:

(*a*) Insufficient cooling. (*b*) Valve burning, wear and failure of valve mechanism. (*c*) Excessive fuel and oil consumption. (*d*) Unreliability and breakdown of big-end bearing assembly. (*e*) Crankshaft failure. (*f*) Faulty installation.

These problems, he proceeded, had been successfully dealt with by much careful experimental work at various sources, and one by one the troubles had been weeded out.

(*a*) *Air-cooling large cylinders.*—The satisfactory cooling of large cylinders was by no means an easy proposition, and it was not until very careful and extended single cylinder experiments were carried out under full load and working conditions that the problem was properly tackled. In considering engines with air-cooled cylinders of 45 to 50 h.p. it was believed that the designer had been faced with more practical difficulties than with other types of internal combustion engines, insomuch as the disposal of the components to allow proper air flow and the limitation of the foundry were very real sources of trouble; consequently, theoretical conditions have had to be sacrificed to a certain extent. The introduction and perfecting of the new 11 mm. diminutive sparking plugs, eliminating hot spots and dead air, had also

* Paper read before the Glasgow Branch of the Royal Aeronautical Society on January 29, 1924.

assisted the development of the air-cooled head. Cylinders had now been evolved with cooling area of not less than 0·25 sq. ft. per b.h.p., and 0·3 in. pitch of fins which would maintain 123 b.m.e.p. continuously for certainly 250 hours without a breakdown.

(*b*) *Valves.*—Overhead valves were essential, and the arrangement of valves on large cylinders to give an adequate length of spring, together with proper air passages, called for considerable scheming. Great strides had been made lately in valve material and alloys of cobalt-chrome and silchrome, and had been of great assistance in eliminating scaling and warping. The question of valve clearances was one of the utmost importance on radial engines. Push-rod mechanism for cylinders up to 6-in. bore was certainly the lightest arrangement, but in the past great trouble had been experienced due to the cylinders "growing" with consequent abnormal clearances between valves and rockers. Some method of automatically taking up the valve clearance as the engine warms up was absolutely essential. This serious trouble with valve mechanism had been satisfactorily dealt with by the patent mechanism of the author's company, whereby the valve automatically maintains the clearance set when the engine is cold.

(*c*) *Petrol and oil consumption.*—Both the petrol and oil consumption in air-cooled radials had been excessive in the past, due partly to overheating and bad distribution, and partly also to the special lubrication problems of radial engines. With the later development of air-cooled cylinders and the elimination of hot spots and the maintenance of more even temperatures, also by the careful investigation of distribution, it had been possible to very greatly improve the petrol consumption of radial engines. On the earlier types of radials some difficulty was experienced with the over-oiling of cylinders. The maximum volume of oil was necessary to keep down the temperature of the big-end bearing, and by the correct design of the crankcase to drain away the oil, and the use of efficient scraper rings, the oil consumption had been greatly reduced, and brought into line with other types of aero engines.

(*d*) *Big-end bearing assembly.*—The big-end bearing assembly of the static radial air-cooled engine required very careful design, and the early types were very inadequate, and quite incapable of giving long service. These failures were due to too high loadings, heavy moving parts, lack of stiffness, and unsuitable lubrication.

It was believed that the plain bearing offered the best solution, as it was lighter, the rubbing speed could more easily be kept down, and with this type the articulated rod pin centres could be kept nearer the centre of the crankpin.

By careful attention to reciprocating parts, the employment of special light alloys for pistons and providing the maximum oil circulation to reduce the bearing temperature, it was possible to obtain a big-end construction with a mean load factor of 10,000 lbs. per sq. in./ft. per sec. which would give an excellent life, comparing favourably with other types of engines.

(*e*) *Crankshaft.*—In single row radial engines, the desire to incorporate a nose to the engine which could be suitably cowled in, and present a good form, had led designers to prolong the propeller end of the crankshaft.

Although the natural period of the single-throw crankshaft was usually well above the running speed of the engine, there was a wide range of speed over which torsional vibrations were intensified, and it was essential that the propeller shaft end should be as short and stiff as possible, so that the natural period was far removed from any possible running speed of the engine.

(*f*) *Installation.*—Referring to the question of installation, the author pointed out that many of the earlier air-cooled radial engines were seriously hampered by incorrect installation. He emphasised the importance of so mounting an engine that not only did an ample volume of air from the slip-stream of the propeller and the forward movement of the machine impinge on to the cylinder head, but means must be provided for enabling the air to get away. It was, he said, impossible for an air-cooled radial engine to function properly if individual cylinders were unevenly cooled, sparking plugs pocketed, etc. From actual flight tests it had been found that comparatively slight alterations to the shape of the cowling had resulted in a remarkable difference in engine performance. The whole question of installation required to be approached from a new standpoint without prejudice, and eliminating many preconceived ideas on the subject. Spinners, although adding to the appearance, were, he said, a constant source of trouble in service, and a doubtful quantity as regards improving performance.

Other points in connection with installation made by the author were

Oil temperature recorders and controllable oil coolers should be fitted. Both for the pilot's comfort, and to make night landing possible, some adequate form of exhaust system was necessary. The design of a suitable manifold required careful consideration, and had to be properly tested out and standardised. Expansion joints were necessary to prevent cylinder head distortion, and rustless iron could be used with advantage to prevent scaling and corrosion.

Mr. Fedden then dealt with the question of cowling, and illustrations of various examples were shown.

In connection with cowling, the author stated that for high-speed machines operating at altitude some form of variable shutter cowling is required, controlled by the pilot, and working in conjunction with an electric galvanometer.

He next touched upon the subject of altitude problems and supercharging. Speaking generally, he said the same difficulties were present with air-cooled engines at altitude as with water-cooled engines.

Of the various methods of supercharging air-cooled radial engines the author was of the opinion that the exhaust-driven turbo compressor was the most promising, but to obtain really satisfactory results the whole engine design required to be specially conceived for the purpose from the outset.

Additional heat problems had to be faced, but this type was self-regulating, and was not subject to mechanical gearing and engagement difficulties, increased fuel consumption, etc.

The author estimated that the net increase in weight of a 400 b.h.p. air-cooled radial engine with exhaust-driven turbo-compressor would be 15 per cent.

As an intermediary step, however, he thought that high-compression air-cooled engines employing the bi-fuel system offered a promising solution. Alcohol fuel was used with this scheme, and successful tests had already been made with 7 to 1 compression ratio, the temperatures being less than with a normal compression engine.

Concluding, the author said :—

"In view of the great improvement made in the reliability and performance of air-cooled cylinders on radial engines, it has been suggested to the author that the "Vee" type of air-cooled engine should receive further attention. The author is not in favour of this view, and is of the opinion that the future of air-cooled engines is in the radial form. A reversion to the "Vee" type sacrifices the weight-saving only possible with the radial, and introduces the undesirable problems existing in "in-line" engines, such as long crankshafts, large heavy crankcases, etc.

"The question will undoubtedly be asked what is the immediate future for the static air-cooled radial engine, especially in view of the fact that most of the classic endurance and racing performances during the last five years have been made with water-cooled engines. The answer to this question is, that all these important performances have been made with engines developed during the last War, when unlimited brains and money could be spent on them; that only since the War has the static air-cooled radial engine received the necessary attention and investigation, and, only within the last 12 to 18 months has this engine been able to really take its place in the front rank with the best water-cooled engines.

"What then is the immediate future of the air-cooled radial engine?

"Although it is generally considered unwise to prophesy on mechanical matters, the author seriously submits that in the light of results already obtained the static air-cooled radial has a remarkably bright future, and that for some years to come this type of engine will have no serious competitor, and will stand alone for the following types of machines :—

1. For light aeroplanes with engines of 1 to 2 litres. 2. For training machines, taxiplanes, and the smaller passenger machines with three, five or seven cylinders of 6 to 9 litre capacity. 3. For single-seater and two-seater fighting machines of all classes. 4. For deck-landing machines, and the smaller float type seaplanes. 5. Generally for machines in extremely hot and cold climates.

"It is impossible to say how much further the field will open out for air-cooled radial engines as time goes on, but until some entirely new type of internal combustion engine is perfected it is confidently believed that the air-cooled radial engine will steadily be used in greater numbers, as its advantages are more fully realised by practical experience, and it is further developed."

AIRMANSHIP AT SEA

The Work of Seaplane Pilots

AT the fortnightly meeting of the Royal Aeronautical Society on February 7, Squadron-Leader R. B. Maycock, O.B.E., R.A.F., who until recently commanded the Royal Air Force Seaplane Development Flight, read a paper on "Airmanship at Sea." One of the factors which had hampered development, he said, was that the seaplane had developed from the landplane with the addition of "sea boots." Most types of seaplanes were easy to fly once they were in the air, but caused considerable difficulties in handling on the water, and therefore combined knowledge of flying and seamanship was essential for the seaplane pilot. Unlike its sister the aeroplane, the seaplane's trials and tribulations did not end with the safe alighting after a flight, but care and experience were still required while "taxying" to moorings or to the slipway. It had been aptly said that mooring a seaplane was analogous to mooring a fully-rigged ship with the sails set; but the lecturer preferred to liken it to a motor auxiliary vessel with the sails always set, the yards always rigidly braced for a wind astern, and the spanker rigged to replace the water rudder—without the possibility of reversing the engines. Nevertheless the lecturer had seen small and difficult harbours—such as Penzance, Newhaven and Torquay—successfully navigated by large flying boats threading their way between large and small craft, frequently lifting a wing to clear to dinghy or buoy, the width between the piers at the harbour entrance being just sufficient to allow the span of the wings a few feet clearance. In multi-engined seaplanes manœuvring could be assisted by using the engines for steering. Wind had infinitely more effect on seaplanes than tide, owing to the large wing-structure swinging like a weathercock to the breeze. The use of a water rudder had been abandoned, but the ailerons were of great assistance in manœuvring on the water. The remaining aid to steering was the "drogue" or sea-anchor. This consisted of a conical-shaped canvas bag open at both ends, and the larger end kept in shape by stiff wires or wood. On being dropped into the water it caused considerable reduction in speed, and acted as a fulcrum about which the craft could be more easily turned.

The seagull kept dry in the roughest sea by facing the wind and paddling slowly into it until he saw a wave which he could not ordinarily surmount, when he spread his wings for the fraction of a second to gain the lift necessary to float over it. In the same way if a seaplane was held against the wind either by an anchor or by using the engines, it would keep perfectly dry, as had been proved in practice in St. Mary's Roads at the Scilly Isles during an experimental cruise in 1922.

The practice of mooring out seaplanes, instead of confining them to places where a special slipway and sheds were provided, was becoming more and more common, and had great advantages. For major overhauls and repairs they still had to be got on shore, but for running repairs a floating dock could be used. Permanent moorings for flying boats should weigh not less than a ton. The buoy chosen was usually small, and it was the practice to make fast direct on to the mooring wire beneath the buoy to obviate the danger arising from possible weakness in the buoy's fittings.

In conclusion, the lecturer mentioned that flying boats had flown from Malta to Constantinople, Gibraltar and Alexandria, involving flights of 1,500–2,000 miles. Tests had been carried out in home waters of flying boats proceeding on endurance trips away from their base up to six weeks, with satisfactory results.

Honours

IN a Supplement to the *London Gazette* published on February 8 is a list of Resignation Honours conferred by the King on the recommendation of Mr. Baldwin, the ex-Prime Minister. Amongst these, the honour of baronet has been conferred on Sir Herbert Hambling, J.P., for important services rendered to the Air Ministry on financial and commercial matters.

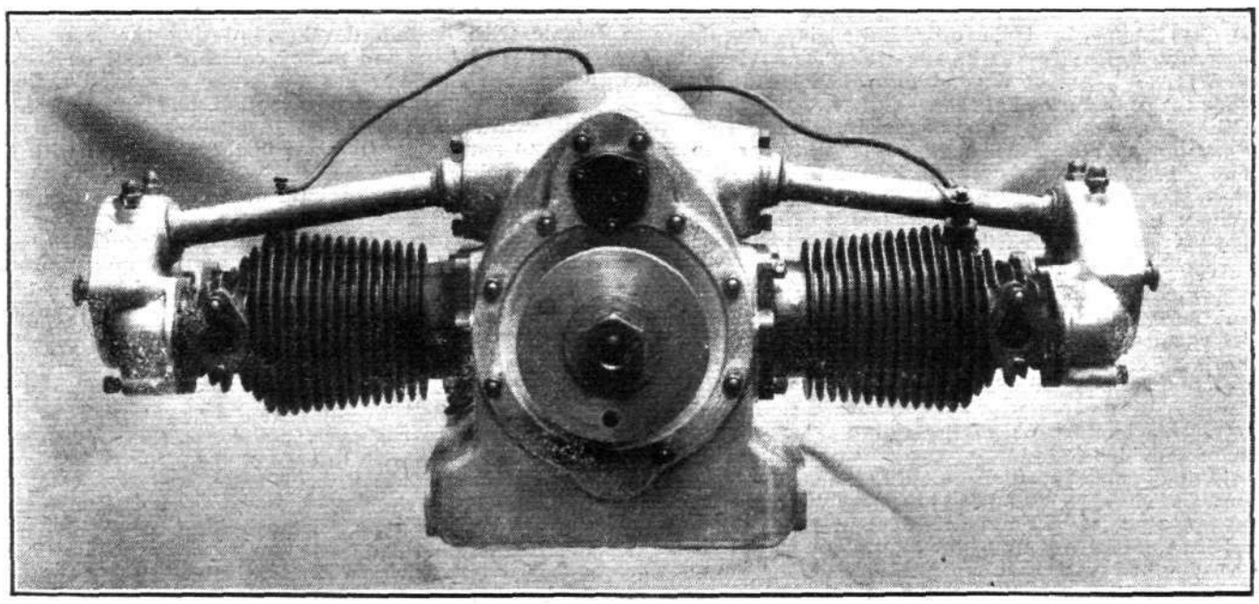
Sir (Henry) Herbert Hambling, eldest son of the late Lieut.-Col. W. J. Hambling, many times Mayor of Dunstable, is 63. He is deputy-chairman of the amalgamated banking concerns of Barclays Bank, the London and South-Western Bank, and the London and Provincial Bank. He is a director of the North British and Mercantile Insurance Co. and of the Colonial Bank. He served on the Cowley Commission on Post Office buildings; he assisted the Lord Mayor in raising the Bankers' Battalion in the War; he was head of the Finance Group of the Ministry of Munitions; he has advised the Government on matters concerning the financial aspects of civil aviation; he is President of the Institute of Bankers; and he has been "pricked" for the office of High Sheriff of Suffolk this year.

Baron Thomson of Cardington

THIS is the title chosen by the new Air Minister, as officially announced in the *London Gazette* of February 12, upon his elevation to the Peerage.

British Aeroplanes for Spain

As a result of practical tests, the Spanish naval authorities have decided to adopt British aeroplanes, and as a beginning a naval commission is to proceed to London to purchase a dozen bombing machines.



A NEW LIGHT 'PLANE ENGINE: The Coventry Victor "Gnat" is a new model specially designed for use on light 'planes. It is rated at 10-38 h.p., and from bench tests it appears that the power output is very high. The overhead valve gear is of somewhat unusual design, and is lubricated by oil mist from the crankcase.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, February 5, 1924

General Duties Branch

M. J. DuCray is granted a short service commn. as Flying Officer on probation, with effect from, and with seny. of, Jan. 23.

Stores Branch

Flying Officer J. L. Armstrong is granted permanent commn. in rank stated for accountant duties ; Feb. 6.

Medical Branch

The follg. are granted short service commns. as Flying Officers, with effect from, and with seny. of, Jan. 23 :—S. G. Gilmore, T. Glynn, M.B. Flying Officer T. A. G. Hudson is promoted to the rank of Flight Lieut. ; Jan. 27.

Reserve of Air Force Officers

The follg. are granted commns. on probation in General Duties Branch, in ranks stated ; Feb. 5 :—

Class A.—Flying Officers.—C. F. W. Dod, H. T. Townsend. *Pilot Officers.*—A Barron, A. E. Betts.

Class AA.—Pilot Officer.—A. L. Robinson.

Class B.—Pilot Officer.—R. F. Cathrow.

The follg. offrs. are confirmed in rank, with effect from the dates indicated:—*Flying Offrs.*—S. H. Gaskell ; Oct. 20, 1923. C. O. Meeke ; Dec. 19, 1923. C. E. Young ; Jan. 20. H. E. R. Nelson ; Jan. 24. E. A. Clear, M.C., P. B. Clews, F. E. Hills, A. J. P. Hytch ; Jan. 31. *Pilot Offrs.*—D. C. Bain ; Jan. 20. R. R. Rich ; Jan. 31.

Memoranda

The follg. relinquish their temp. commns. on ceasing to be empld. :—Squadron-Leader A. W. Northover, M.C. ; Oct. 10, 1923. Flying Offr. L. H. Morgan-Browne ; Nov. 21, 1923.

Sec. Lieut. H. C. Densham relinquishes his hon. commn. on enlistment in the Army ; Dec. 31, 1923.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified :—

General Duties Branch

Squadron Leader.—W. H. L. O'Neill, M.C., to H.Q., Coastal Area. 18.2.24.

Flight-Lieutenants.—E. G. Hilton, A.F.C., to No. 7 Sqdn., Bircham Newton. 14.2.24. G. Martyn and V. H. Markham, both to No. 7 Sqdn., Bircham Newton. 12.2.24. F. R. Alford, M.C., to No. 100 Sqdn., Spittlegate. 18.2.24. R. W. Chappel', M.C., to Inland Area Aircraft Depot, Henlow. 11.2.24. F. J. Vincent to No. 32 Sqdn., Kenley. 14.2.24. W. H. Park, M.C., D.F.C., to Aeroplane Experimental Establt., Martlesham Heath. 12.2.24. J. A. W. Binnie, to No. 24 Sqdn., Kenley. 12.2.24. H. S. P. Walmsley, M.C., D.F.C., to Boys' Wing, Cranwell. 14.2.24. A. E. Dark, to Armament and Gunnery Schl., Eastchurch. 14.2.24. F. J. Fogarty, to No. 2 Flying Training Schl., Duxford. 14.2.24. K. A. Lister-Kaye, to No. 11 Sqdn., Bircham Newton. 17.2.24.

Flying Officers.—D. S. Buchanan, to No. 7 Sqdn., Bircham Newton. 1.2.24. J. S. Harrison, to R.A.F. Base, Gosport, on transfer to Home Establt. 14.2.24. P. J. Chambers, to No. 2 Sqdn., Andover, on transfer to Home Establt. 29.1.24. T. S. Horry, D.F.C., to Night Flying Flight, Biggin Hill. 12.2.24. G. C. Bladon and A. E. Beilby, both to R.A.F. Base, Gosport. 12.2.24. O. D. Freeman, to Schl. of Photography, Farnborough. 11.2.24. J. G. Peck and D. C. Prance, both to No. 2 Flying Training Schl., Duxford. 13.2.24. C. W. McK. Thompson, to No. 24 Sqdn., Kenley. 7.2.24. J. C. Barraclough, to Aircraft Depot, Egypt. 26.1.24. C. Bousfield, to No. 14 Sqdn., Palestine. 26.1.24. H. A. Castaldini, to Marine and Armament Experimental Establt., Isle of Grain. 1.2.24. J. H. Gray, to No. 5 Flying Training Schl., Shotwick, on transfer to Home Establt. 31.1.24. A. S. Godley, to No. 24 Sqdn., Kenley. 11.1.24. L. W. Mercer, to R.A.F. Trans-Jordania H.Q., Palestine. 1.2.24. E. V. H. Hudson, to No. 14 Sqdn., Palestine. 1.2.24. R. F. Browne, D.F.C., to No. 5 Armoured Car Co., Iraq. 22.1.24. J. A. Hollis, H. A. Boniface, E. Cuthbert and E. P. Colam, all to Aircraft Depot, India. 5.12.23. E. N. D. Worsley, to No. 4 Flying Training Schl., Egypt, for course of instruction. 19.12.23. H. J. T. Russell, to No. 70 Sqdn., Iraq. 8.1.24.

Pilot Officers : E. Reid, to No. 111 Sqdn., Duxford. 1.2.24. R. G. Rickman, to No. 24 Sqdn., Kenley. 1.2.24. A. G. Everett, to No. 24 Sqdn., Kenley, on transfer to Home Estab. 10.1.24. F. E. Nuttall, to No. 4 Sqdn., S. Farnborough. 1.2.24.

Pilot Officers.—B. D. J. Broadway, to No. 32 Sqdn., Kenley. 7.2.24. R. Scott-Taylor, to No. 25 Sqdn., Hawkinge. 7.2.24. E. Reid, to R.A.F. Base, Leuchars, instead of to 111 Sqdn., as previously notified. 8.2.24. J. W. New, to No. 7 Sqdn., Bircham Newton. 11.2.24. L. V. H. G. Clark, to No. 4 Flying Training Schl., Egypt, for course of instruction. 1.2.24. G. R. A. Pallin, to No. 4 Flying Training Schl., Egypt, for course of instruction on appointment to a Short Service Commn. 31.1.24.

Stores Branch

Squadron Leader W. J. Shields, to R.A.F. Depot, on transfer to Home Estab. 23.12.23.

Flight Lieutentants : A. W. Turner, to No. 100 Sqdn., Spittlegate. 1.2.24. A. E. Sutton-Jones, to No. 3 Stores Depot, Milton. 4.2.24. G. A. Curtiss, to No. 3 Group H.Q., Spittlegate. 11.2.24. M. J. James, M.B.E., to R.A.F. Depot, on transfer to Home Estab. 10.1.24.

Flying Officers : H. N. Stevens, to R.A.F. Depot (non-effective pool). 30.12.23. W. B. Frederick, to R.A.F. Depot (non-effective pool). 10.1.24. F. W. Taylor, to No. 12 Sqdn., Northolt. 18.2.24. G. W. Sturman, to R.A.F. Depot (non-effective pool), on transfer to Home Estab. 30.12.23. F. A. Skoulding, to R.A.F. Depot, on transfer to Home Estab. 30.12.23. E. F. Elliott, to R.A.F. Depot, on transfer to Home Estab. 10.1.24.

Medical Branch

Flight Lieutentants : J. Prendergast, M.B., B.A., to Stores Depot, Iraq, 18.2.23, instead of to No. 84 Sqdn. as previously notified. E. G. Howell, to R.A.F. Depot. 30.1.24. J. J. Clarke, to Research Lab. and Medical Officers' Sch. of Instruction, Hampstead, on appointment to a short service commn. for short course. 28.1.24. C. P. Barber and B. F. Haythornthwaite, M.B., B.A., both to Aircraft Depot, India. 28.12.23. C. A. Lindup, to No. 27 Sqdn., India. 28.12.23.

Flying Officers : S. G. Gilmore and T. Glynn, M.B., both to Research Lab. and Medical Officers' Sch. of Instruction, Hampstead, on appointment to short service commns. for short course. 23.1.24.

Chaplains' Branch

Rev. M. H. Edwards, M.A., to R.A.F. Base, Calshot, on transfer to Home Estab. 10.1.24.

Store and Accountant Branch

Squadron Leader (*Stores*).—J. C. E. Gillham, to H.Q., Iraq. 1.1.24.

Flight Lieutenant (*Accountant*).—C. C. J. Croydon, to No. 1 Schl. of Tech. Training (Boys), Halton. 12.2.24.

Flight Lieutenants (*Stores*).—F. Whilton, D.C.M., to Marine and Armaments Experimental Establt., Isle of Grain. 1.2.24. N. H. Fuller, to No. 10 Group H.Q., Lee-on-Solent. 22.2.24. W. C. Green, M.C., to H.Q., Cranwell 15.2.24.

Flying Officers (*Stores*).—A. T. Shaw, to R.A.F. Depot. 11.2.24. R. Blackith, to No. 56 Sqdn., Biggin Hill. 11.2.24.

AIR SERVICE RE-UNIONS AND FUNCTIONS

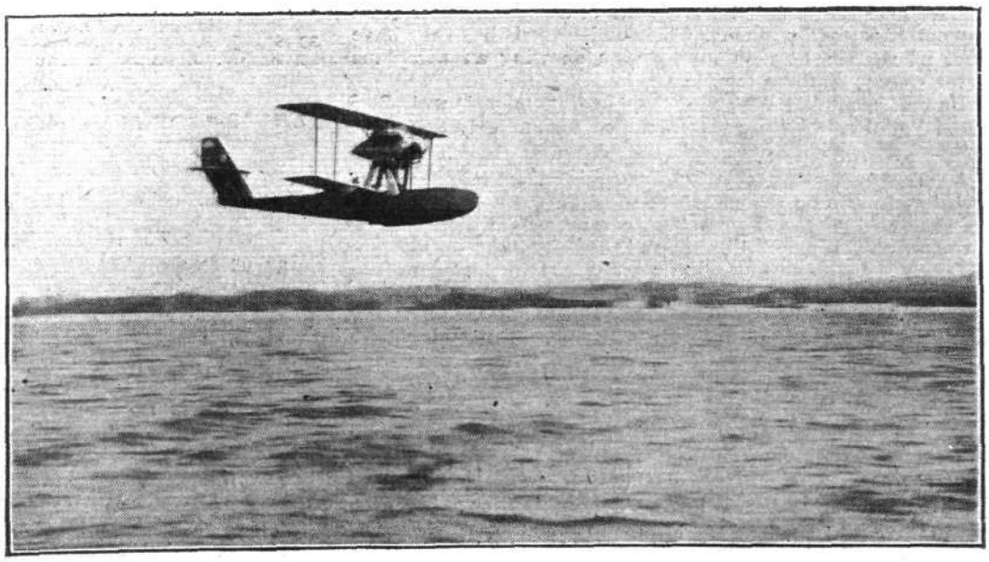
Announcements for this column are invited and inserted without charge.

A Re-union Dinner for Serving Officers of the R.A.F. who have served in the (R.A.F.) India Command will be held at the Savoy Hotel on Saturday, March 8, at 8 p.m.

Air Vice-Marshal P. W. Game, C.B., D.S.O., will take the chair.

Tickets, 15*s.* 6*d.* each, exclusive of wines, may be obtained from Flight-Lieut. C. J. S. Dearlove, R.A.F. Depôt, Uxbridge. Application for tickets should be made before March 4.

A Record-Breaking Seaplane: The C.A.M.S. 36 bis has just beaten the world's altitude record for seaplanes by reaching, piloted by Hurel, an altitude of 6,200 metres (20,300 ft.). This record has been homologated.



BY DOUGLAS B. ARMSTRONG

Brazilian Prospects

BRAZIL is likely to be the scene of a special issue of aero stamps in the near future, if a recommendation recently adopted by the Brazilian Senate is acted upon. This provides for the establishment of two air mail lines, between Rio de Janeiro and Porto Alegre, before June of this year. There will be a coastal route maintained by hydroplanes and an overland service by means of military aeroplanes. Certain postage stamps now current in Brazil bear a vignette of an aeroplane flying in the dawn, and are inscribed "AVIACO," but they have no connection with the air post service, merely typifying one of the several methods used in transporting the mails under modern conditions.

U.S.A. Hydroplane Mail, 1923

THE Aero Philatelic Society of America, although of comparatively recent foundation, is making rapid strides, having already enrolled its full quota of Charter members. A very interesting publication is its *Aero Newsletter*, a mimeographed journal now in its fourth number. The January issue includes a detailed account of a hydroplane post between New Orleans and Pilottown (La.), contributed by Vice-President Harry A. Truby. This service was inaugurated on April 9, 1923, by authority of the U.S. Postmaster-General in connection with the outgoing mail steamships for Central America and Cuba.

Four sacks of mail carried by the hydroplane "Maby" were safely delivered on board S.S. *Coppename en route*, thus expediting delivery by from five to six days. Letters and postcards carried on the inaugural flight were impressed with an oval souvenir cachet in carmine ink reading "VIA HYDROPLANE MAIL—FIRST TRIP—NEW ORLEANS—PILOTTOWN, LA.," which, although unofficial, serves to distinguish first "flown" covers for the benefit of aero philatelists. The service is still in regular operation, but no special mark is used on letters thus conveyed.

Moorish Air Stamp Error

ERRORS of a strictly philatelic nature are comparatively infrequent in contemporary air post stamps, owing to conditions of surveillance under which they are produced. The writer has been shown, however, a genuinely flown air post cover franked with an undoubtedly *imperforate* specimen of the 50 centimes air post stamp of Morocco. No other example of the error is known to exist, either used or unused, and its rarity is unquestionable. It bears the Rabat postmark of November 1, 1923

Forthcoming Issues

THE long-promised definitive series of aero stamps for Siam is reported to be imminent. It is understood that they have been printed in London in a design showing an aeroplane flying over a Siamese temple.

New Russian air post vignettes in denominations 1, 3, 5 and 10 gold roubles are also heralded for an early début.

"Aerogrammes"

AIR post collecting is gradually acquiring a distinct nomenclature of its own. The latest addition to the aerosemist's vocabulary is the word "aerogramme," which figures throughout the new "Champion" Catalogue as an apt and welcome substitute for the somewhat overworked definition "flown cover." It has the advantage of being equally intelligible in English or in French, and this fact alone should ensure its universal adoption by air post enthusiasts everywhere.

Germany's New Aero Stamps

WHEN the German air post service resumes operations in the near future, a new set of aero stamps will be brought into use as a result of the adoption of the gold renten mark as the basis of all postal charges. They will be printed in single colours in the Futurist "Dove" design of the 1922-23 issue, and will comprise the following denominations: 5 rentenpfennig, green; 10 rpf., red; 20 rpf., blue; 50 rpf., orange; 100 rpf., violet; 200 rpf., greenish-blue; 300 rpf., grey, the colour scheme following that of the current postage stamps.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

THURSDAY, February 28, at 7.30 p.m., Mr. B. K. Johnson will give a lecture on "The Progress of Flight from 1600 to 1924" (illustrated by lantern slides).

This lecture will not be of a technical nature, but is intended to give a brief historical account of the progress in aeronautics from the early days.

Thursday, March 13, at 7.30 p.m., Dr. A. P. Thurston will give a lecture on "The Evolution of Aeronautical Science" (illustrated by lantern slides).

Thursday, March 27, at 7.30 p.m., Mr. A. F. Houlberg will give a lecture on "Early Model Aeronautical Experiences" (illustrated by lantern slides).

The above lectures will be given at the headquarters of the S.M.A.E., British Empire Room, Y.M.C.A., Tottenham Court Road, London, W.C. 1.

A. E. JONES, *Hon. Sec.*

PUBLICATIONS RECEIVED

British Standard Method for the Determination of Viscosity in Absolute Units. No. 188—1923. British Engineering Standards Association. London: Crosby Lockwood and Son. Price 1*s.* net. Post free 1*s.* 2*d.*

Douglas Engines for Light Aircraft. Douglas Motors, Ltd. Kingswood, Bristol.

Aeronautical Research Committee Reports and Memoranda: *No.* 797. (*Ae.* 53).—On the Rate of Transmission of Heat from the Walls of an Airship Passenger Car. By Miss D. Marshall. April, 1922. Price 6*d.* net. *No* 819 (*Ae.* 71).—On the Determination of the Stresses in Braced Frameworks: Part IV. The Effects of Axial Loading, Flexure, Torsion and Shear upon a Tubular Framework. By R. V. Southwell. Sept., 1922. Price 6*d.* net. *No.* 831 (*Ae.* 82).—On the Effect of Sideslip on the Aerodynamic Forces and Moments for a Model S.E. 5A Aeroplane. By H. B. Irving. August, 1922. Price 1*s.* net. *No.* 855 (*Ae.* 95).—Some Suggestions for Improving Aeroplane Control at Low Speeds. By A. Fage. Feb., 1922. Price 6*d.* net. *No.* 856 (*Ae.* 96).—Some Experiments on a Model Biplane having Slotted Wings. By H. V. Irving and A. S. Batson. Feb., 1923. Price 6*d.* net. *No.* 858 (*Ae.* 98).—The Resistance of a Spheroid. By R. Jones and A. H. Bell. Nov., 1922. Price 6*d.* net. London: H.M. Stationery Office, Kingsway, W.C.2.

Revue Juridique Internationale de la Locomotion Aérienne. January, 1924. Edition Aérienne, 4, Rue Tronchet, Paris.

Grundlagen des Automobilbaues. By Prof. Dipl.-Ing. W. Ghittis. *Automobiltechnische Bibliothek, Vol. XII.* M. Krayn, Genthiner Strasse 39, Berlin, W. 10. Price 10*s.*

Canadian Patent Office Record. Vol. LII, No. 4. *January* 22, 1924. Patent and Copyright Office, Ottawa, Canada. Price 10 cents.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motor

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1922

Published February 14, 1924

27,521. SPERRY GYROSCOPE CO. Steering mechanism. (209,799.)
27,930. J. D. BATTEN. Motive mechanism for a man-power flapping-wing aerial machine. (209,807.)
30,230. ENGLISH ELECTRIC CO., LTD., and W. O. MANNING. Hydraulically-actuated mechanism for control-gear of aeroplanes. (209,877.)
31,512. FAIREY AVIATION CO., LTD., and C. R. FAIREY. Seaplanes, amphibians, etc. (209,890.)
32,061. J. R. PORTER. Aeronautical machines. (209,895.)
32,592. W. B. PATERSON. Two-stage rotary engines. (209,904.)

APPLIED FOR IN 1923

Published February 14, 1924

7,761. SCHNEIDER ET CIE. Apparatus for ascertaining altitude of aerial targets. (195,616.)

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